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# Technical Report

## Technology Master Process Handbook

Prepared for

HQ AFMC/STPS  
Wright-Patterson AFB, Ohio 45433

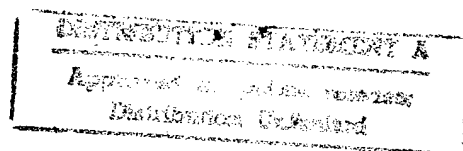
June 8, 1994

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Leadership in  
Applied  
Information  
Technology

8 June 1994

Department of the Air Force  
HQ AFMC/STPS  
Wright-Patterson AFB, OH 45433

Attention: Maj. Fred W. Harrington  
Subject: SIDAC Delivery Order No. 0030 CDRL A001C,  
Data Item MISC-80508  
Reference: Contract F33657-92-D-2055  
TASC No. J6760-D11

Dear Maj. Harrington:

Enclosed please find three copies of the final technical report entitled, "Technology Master Process Handbook", for Technology Master Process (TMP) Support required under the above-referenced contract.

If you have questions regarding this transmittal, please contact me at (513) 426-1040.

Sincerely,

Thomas J. Dickman  
Task Leader

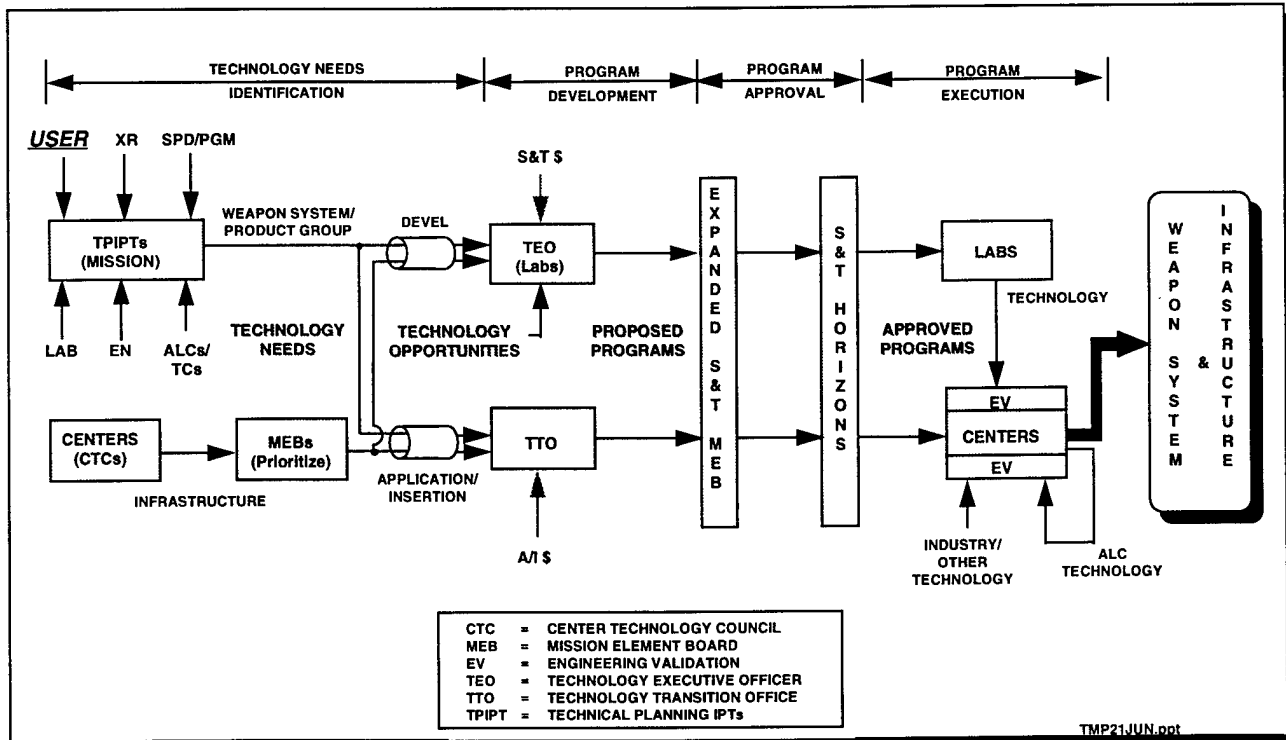
TJD/cmb

Enclosure(s)

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# TECHNOLOGY MASTER PROCESS HANDBOOK

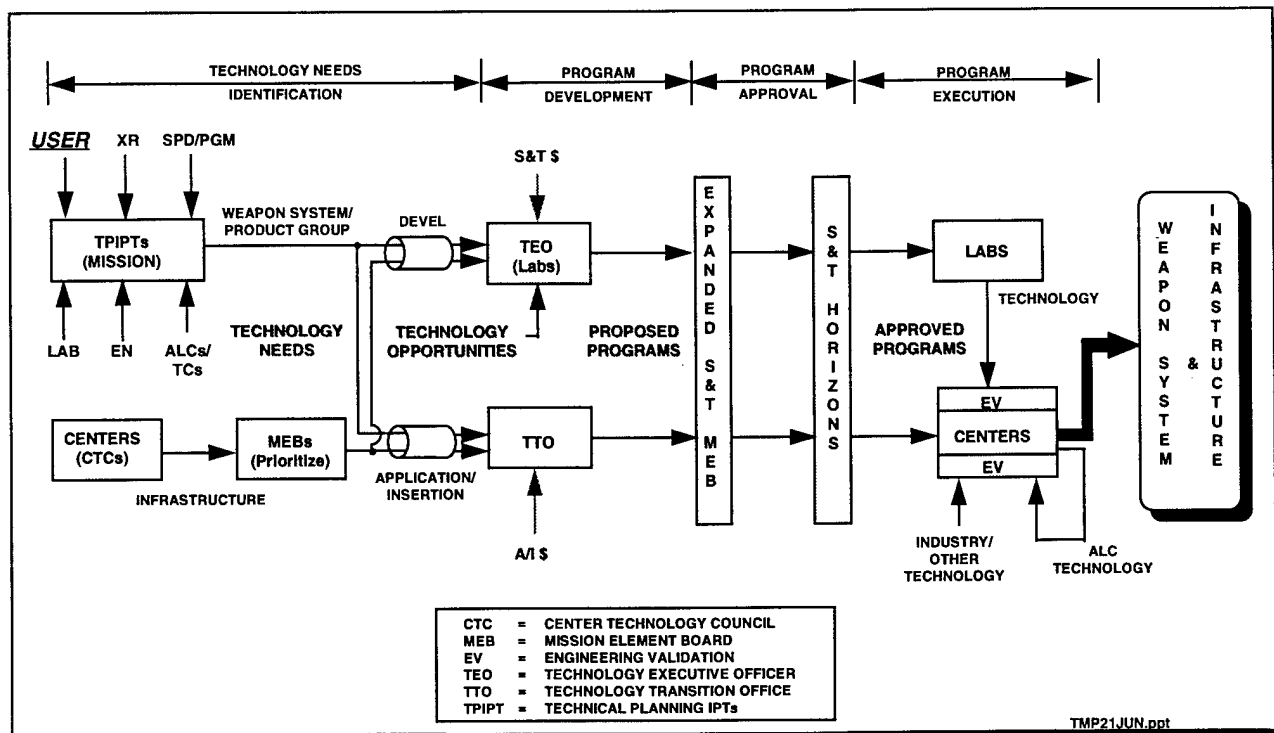


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# CHAPTER 1

## OVERVIEW OF THE TECHNOLOGY MASTER PROCESS



This chapter provides a history and a quick overview of the Technology Master Process. It lays the foundation for understanding the remainder of the handbook.

## **1.1 GUIDANCE**

With the inception of the Air Force Material Command, Integrated Weapon System Management (IWSM) was established to provide single management for all aspects of a weapon system throughout its life cycle. Two key aspects of IWSM are to provide a "single face" to the user and "cradle-to-grave" management support for the systems. IWSM is based upon the definition and continuous improvement of eight critical processes: Requirements, Program Management, Systems Engineering / Configuration Management, Financial Management, Logistics, Contracting, Test and Evaluation, and Technology Insertion. These processes reflect the major areas of operation for the single manager and the command as a whole. Technology Insertion as a core process is also reflected within the AFMC goal of sustaining technological superiority. The Technology Master Process (TMP) has been developed and adopted to plan and execute a seamless AFMC technology strategy to meet this goal.

## **1.2 PURPOSE**

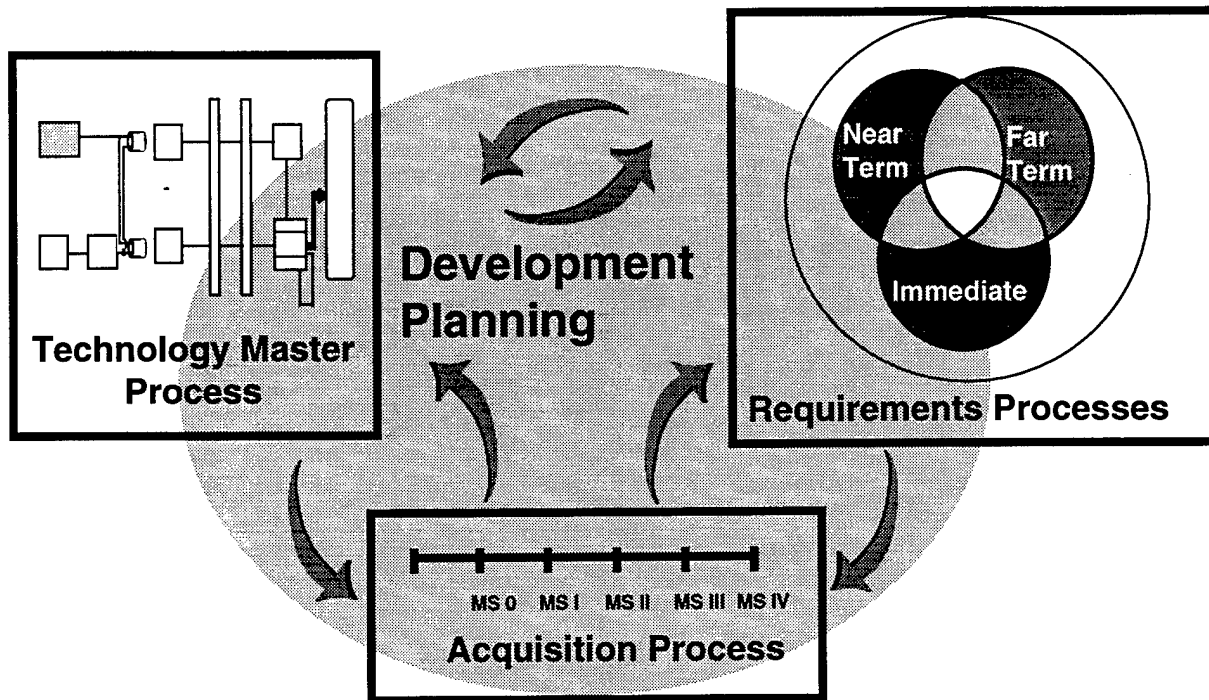
The purpose of this guide is to provide a descriptive summary of the TMP and its major subprocesses. It is intended to give the reader insight into the TMP, how the subprocesses flow and interconnect, interaction between the TMP and other processes, and to identify the key players and their roles and responsibilities. This second iteration of this guide brings the reader up to date with current policies and procedures embodied in the TMP. This guide will be updated periodically as the TMP matures.

## **1.3 TECHNOLOGY MASTER PROCESS**

The TMP is an integral part of the Air Force development planning process shown in Figure 1.3-1. It is used to plan and execute a seamless AFMC technology strategy. It provides a comprehensive process for technology development, transition, application / insertion, and transfer by ensuring:

- (1) All needs of external and internal AFMC customers are identified and prioritized for AFMC action
- (2) Dollar-constrained technology projects are formulated in a highly integrated manner with full participation of all stakeholders
- (3) Technologies flowing into AFMC centers for application /insertion are validated and ready to enter the full acquisition cycle.





**Figure 1.3-1** Integrated Air Force Development Planning Processes

These sub-processes are grouped into four phases:

- (1) Technology Needs Identification
- (2) Program Development
- (3) Program Approval
- (4) Program Execution

### **1.3.1 Technology Needs Identification**

This phase includes the interaction with the user, the test organizations, the laboratories, the logistics centers, the product centers, and the program offices to identify and prioritize technology needs to maintain and improve the warfighting capability in the field. The identification of needs is accomplished through the work of Technical Planning Integrated Product Teams (TPIPTs), the Center Technology Councils (CTCs), and the Mission Element Boards (MEBs).

### **1.3.2 Program Development**

During the program development phase, proposed technology development projects are formulated to meet the weapon system and infrastructure needs identified by the TPIPTs and CTCs. The Technology Executive Officer (TEO), will select technology development projects proposed by the laboratories for those weapon system and infrastructure needs that require the development of new technologies. These projects will be constrained and based on TEO allocation of science and technology dollars against the highest priority needs across all mission elements. The Technology Transition Office (TTO) will formulate proposed technology application / insertion projects for those weapon system and infrastructure needs that can be met with emerging or existing technologies. These projects will be constrained and based on TTO allocation of technology application/insertion dollars against the prioritized needs. The combination of prioritized projects forms the AFMC S&T investment plan.

### **1.3.3 Program Approval**

Approval of the proposed technology development projects will be accomplished by the Expanded Science and Technology Mission Element Board (Expanded S&T MEB) consisting of senior MAJCOM representatives, center representatives, AFMC MEB chairpersons, and Functional Element Board chairpersons. The Expanded S&T MEB will review the full portfolio of proposed technology development and technology application/ insertion projects. A set of technology application / insertion projects will be approved for execution. The approved set of the technology development projects will be forwarded to the laboratory commanders for execution. At the S&T HORIZONS, the AFMC Corporate Board will review the approved sets of technology projects and issue guidance for conducting the next cycle. The entire portfolio of approved technology projects forms the AFMC S&T investment plan.

### **1.3.4 Program Execution**

The approved sets of technology projects are executed by the appropriate laboratories and AFMC centers. An engineering validation process will be conducted by each AFMC center to reduce engineering development and application risk by ensuring the technology meets a set of maturity criteria for performance, sustainability, and affordability before it proceeds to engineering development or application/insertion.

### **1.3.5 TMP Timeline**

The TMP follows the general timeline shown in Figure 1.3-2. The TMP is a continuous process and most of the elements are being updated throughout the year, however, the general sequence of events shown in the figure is followed.



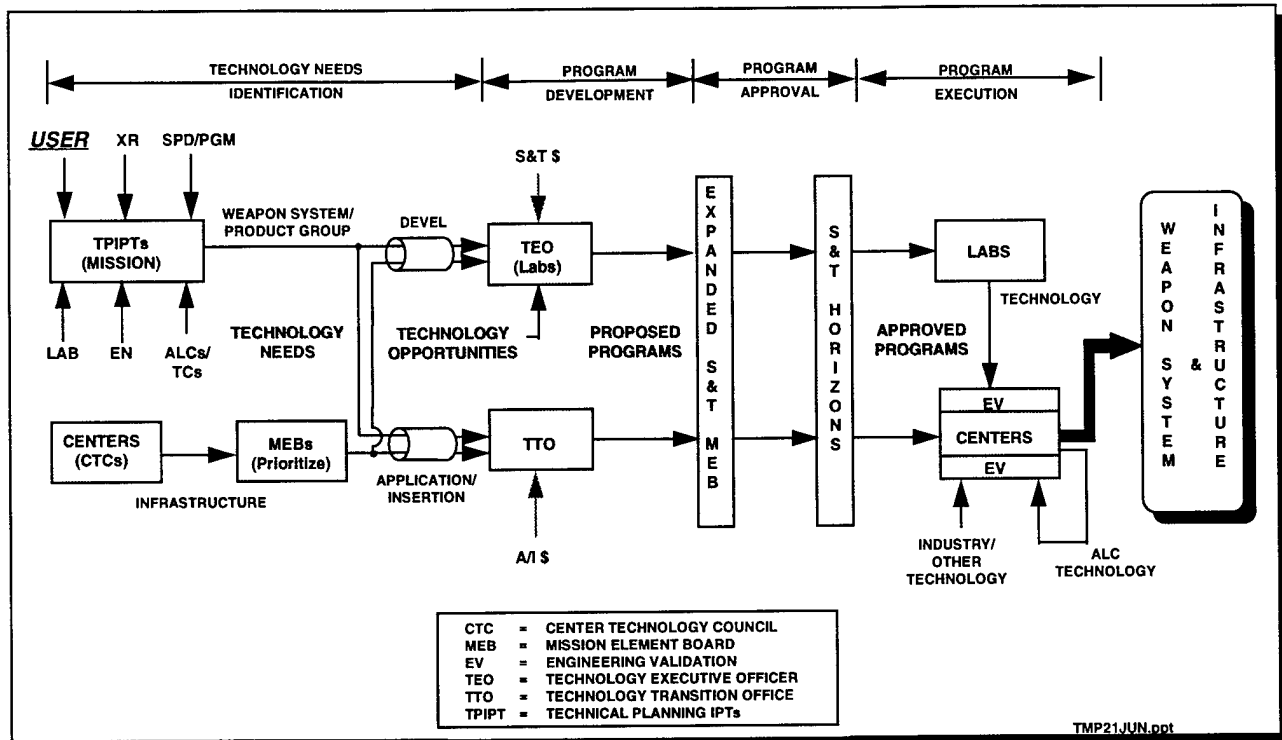
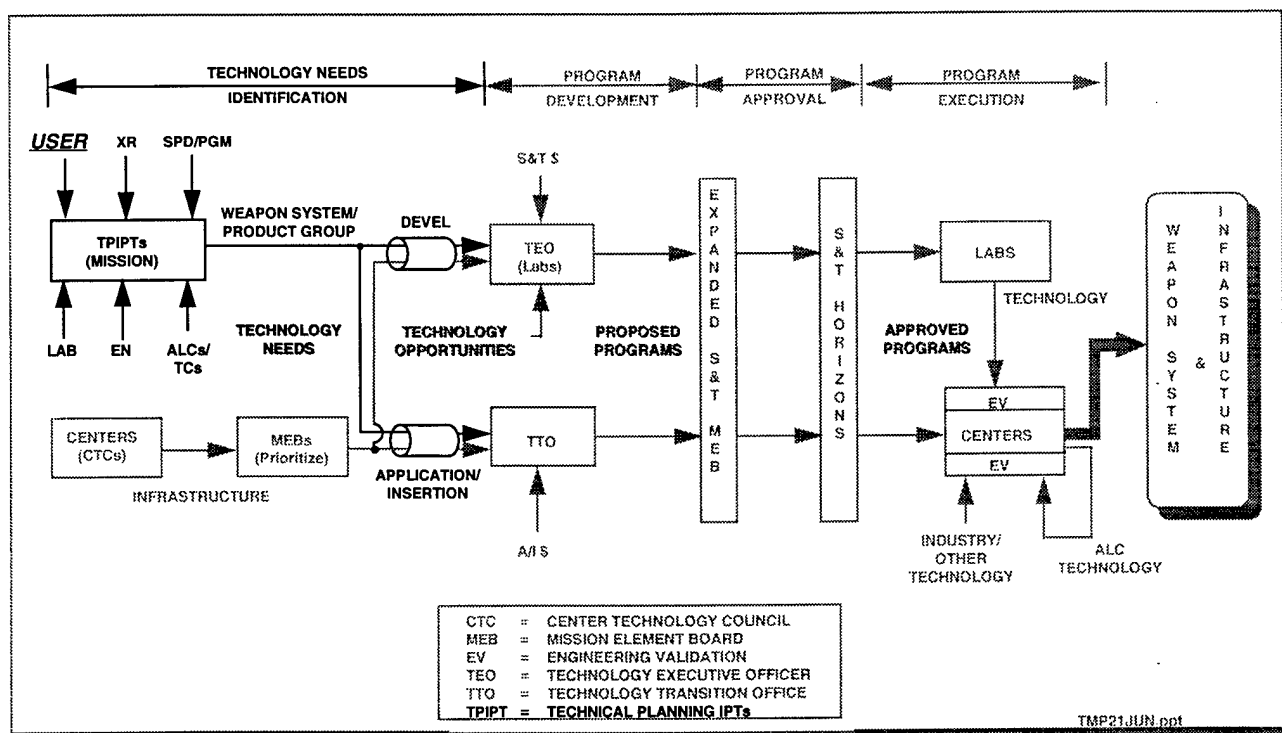


Figure 1.3-3 Technology Master Process

# CHAPTER 2

## TECHNICAL PLANNING

### INTEGRATED PRODUCT TEAMS (TPIPTs)



This chapter describes the role of the Technical Planning Integrated Product Teams (TPIPTs) in the Technology Master Process.

## **2.1 BACKGROUND**

Throughout AFMC, planning process changes are being implemented to significantly improve the research and development planning process for accelerating technology transition. The most prominent factors contributing to these changes are the need to increase user involvement in determining technology requirements, to enhance user understanding and support of emerging technologies and new concept options, and to reduce risk to current and future programs.

To better focus our technology and systems development efforts, Technical Planning Integrated Product Teams (TPIPTs) have been established to integrate information from all of the stakeholders, provide a forum to understand AF mission area requirements, and develop system concept options and identify technology needs. Representatives of the stakeholders (MAJCOMs, logistics centers, product centers, test centers) are to be members of TPIPTs to ensure all pertinent and significant issues are thoroughly addressed.

## **2.2 DESCRIPTION**

The TPIPTs are networks of experts from the development planning community, the centers, and operational commands that plan and facilitate the transition of technical solutions to users' long term operational needs. TPIPTs facilitate the planning and development of technically superior solutions to both the long and short term operational needs of the users. As shown in Figure 2.2-1, a typical TPIPT consists of development planners from product center XRs, operational command users, technology planners from Air Force laboratories, logistics center planners, system engineers, and representatives from test organizations, program offices, and intelligence agencies. TPIPTs are organized by mission or functional area to gather, analyze, coordinate, and disseminate information in each Air Force mission area. Each product, logistics, and test center may have several TPIPTs organized according to applicable mission areas and facilitated by development planners from XRs.

## **2.3 OBJECTIVE**

The objective of TPIPTs is to provide development planning support for users through the creation of development plans and investment recommendations for all Air Force mission areas. TPIPTs will gather, organize, analyze, prioritize, and disseminate information relating user requirements to technology development and transition for current and future systems and for support infrastructure.

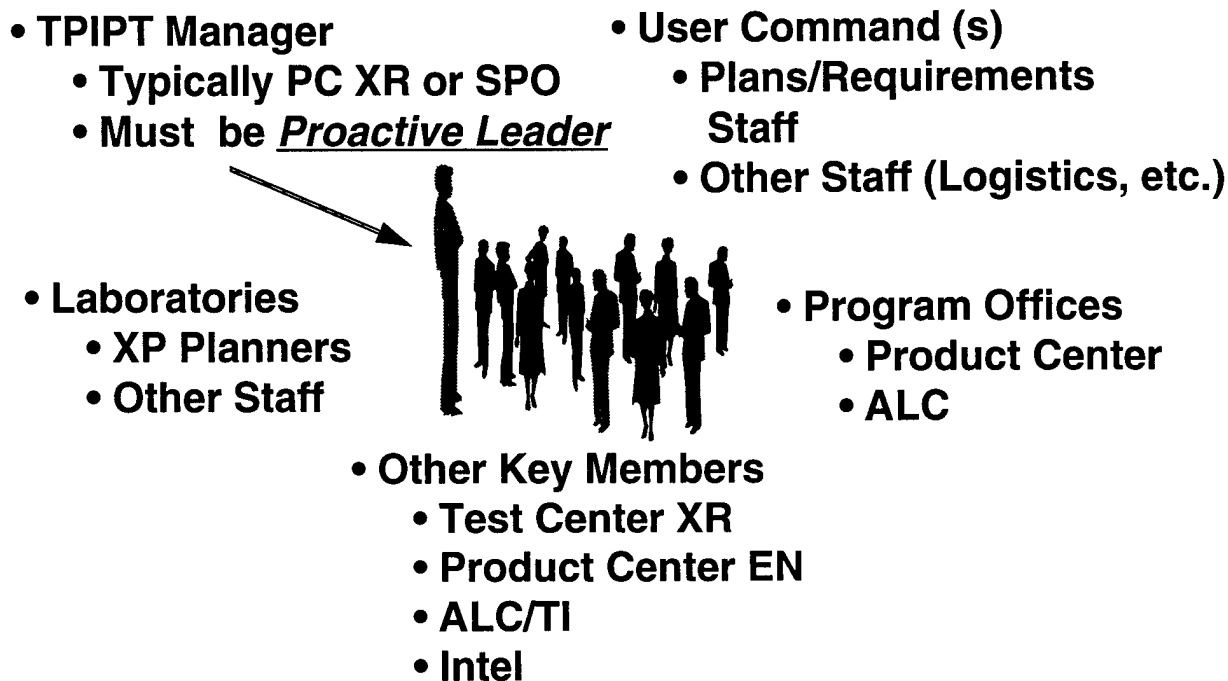


Figure 2.2-1 Key TPIPT Membership

## 2.4 IMPLEMENTATION

### 2.4.1 Responsibilities

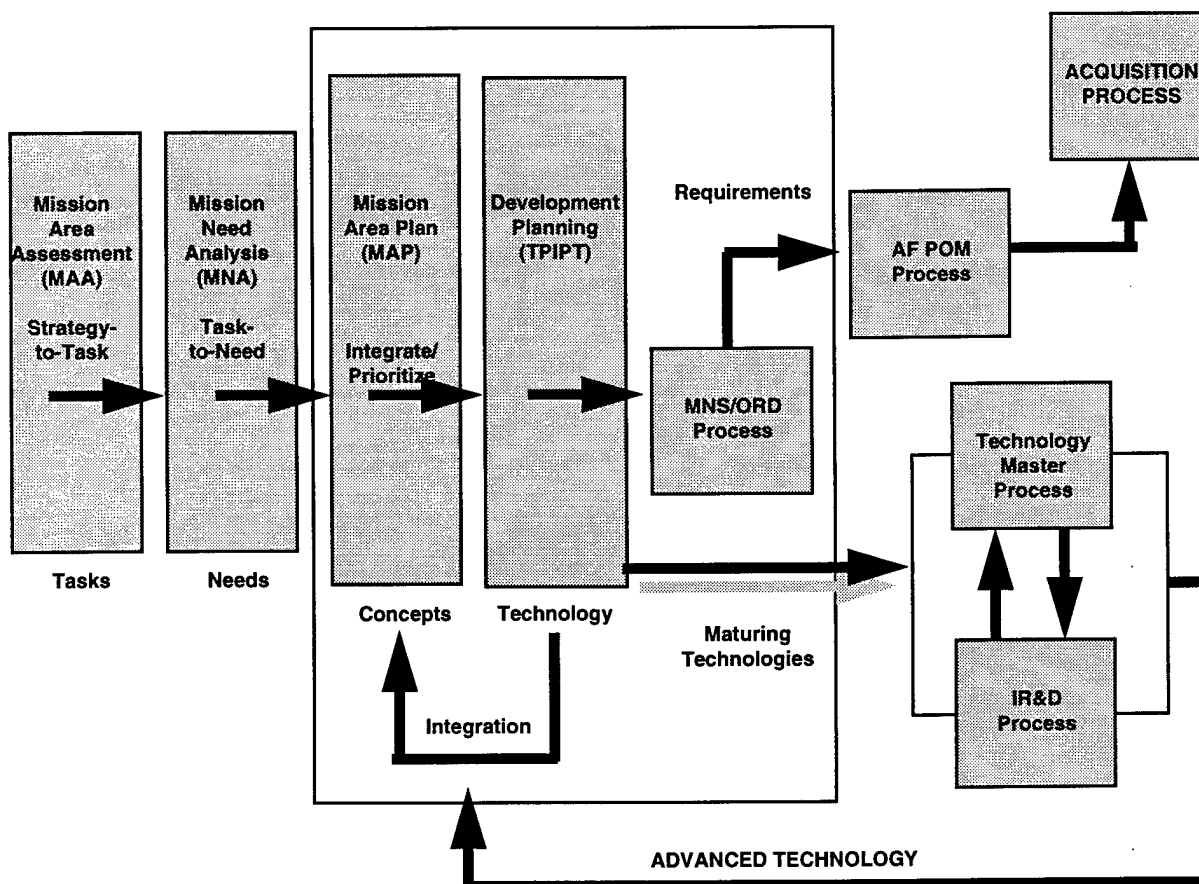
AFMC has responsibility for total life cycle systems management. Inherent in that responsibility is the ability to develop and introduce advanced technologies into both current and future systems. The TPIPTs contribute to the AFMC task by identifying and prioritizing technology needs within mission areas. Each TPIPT is assigned specific functional or mission areas of responsibility and support decision makers through development plans and proposed investment strategies. Each TPIPT will also serve as the functional area focal point for user needs. The responsibilities of the TPIPTs include:

- Conducting analyses to assist the users in developing strategic plans to meet their needs
- Gathering, assessing, organizing, and disseminating information on technology available from other services, other government organizations, industry, and foreign governments
- Prioritizing the needs that have been identified within each mission area

- Assisting program offices with technology insertion planning throughout the entire system life cycle
- Assisting in the planning of technology investments for products, materiel, industrial base infrastructure, and application of technology to fielded systems
- Defining needed intelligence products focused to support research planning efforts.

## 2.4.2 Functions

The TPIPTs translate the needs expressed by the MAJCOMs in the Mission Area Plans (MAPs) to a range of system concept alternatives and associated critical technologies. Figure 2.4-1 shows the relationships involved in the mission planning process.



**Figure 2.4-1** Mission Planning Relationships



In fulfilling their overall purpose, the TPIPTs perform the following functions:

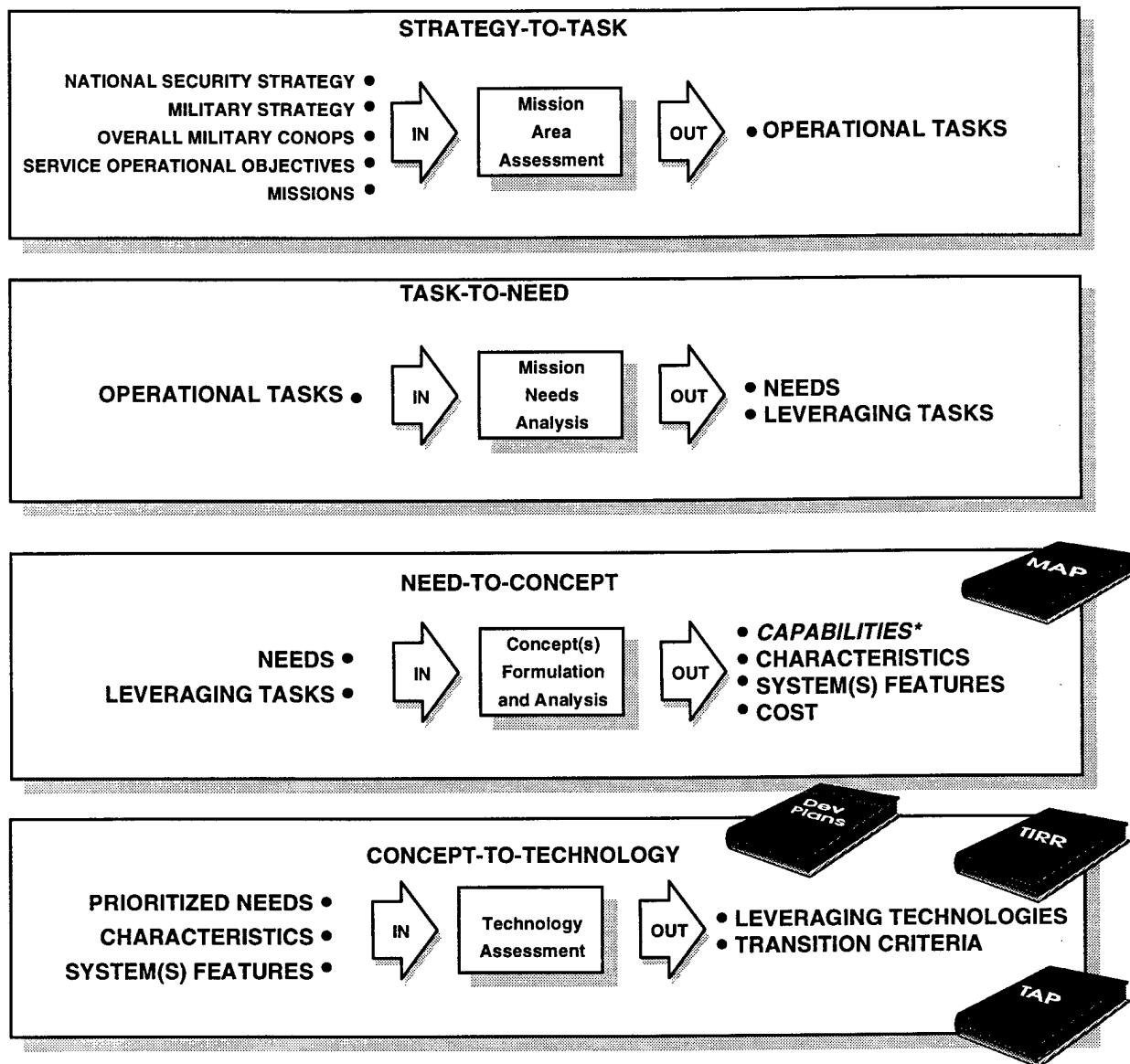
- Provide Development Plans. TPIPTs are to create, maintain, and annually update Development Plans (based upon MAJCOM generated MAPs) for the development and acquisition of system concept alternatives to implement documented, prioritized capabilities required by the operational users. The plans are to project the systems and associated critical, enhancing, and pervasive technologies required to provide the capabilities, and define when the maturing technologies will be needed for integration into operational systems or concepts to be developed. These plans will also include all relevant competing system, concept, and technology alternatives, and provide the supporting rationale for the recommended development systems, concepts, and technologies, and their phasing. In addition, the plans should identify additional technologies considered key to implementing future capabilities. The plans will also include estimates of the fiscal year system development funding required and a recommended technology investment strategy which recognizes overall fiscal year funding constraints. While the TPIPT may recommend levels of investment funding in specific technologies or technology areas to support the plans, the laboratory commanders remain ultimately responsible for planning and executing the laboratories' overall science and technology program. Where recommended system and /or technology solutions overlap TPIPT functional or mission areas of responsibility, the respective TPIPTs will coordinate their plans to provide a consistent, integrated recommendation.
- Promote the Flow of Information. TPIPTs will gather, organize, and make available to appropriate organizations the following:
  - Statements of user tasks and deficiencies, requirements, and priorities.
  - Information on relevant technology programs, including manufacturing technology programs, within the Air Force, Navy, Army, Marine Corps, NASA, ARPA, DOE, national laboratories, other federal agencies, industry (IR&D), and foreign governments.
  - Statements of derived technical system, concept, or program requirements from the System Program Directors (SPDs) and the Directorate for Requirements (XR).
  - Descriptions of pervasive breakthrough technology efforts underway but not currently focused to specific functional areas.
  - Schedules for major TPIPT meetings and reviews.
- Assist in Technology Development Planning. TPIPTs will assist Air Force laboratories in identifying technology needs and performance parameters for emerging technologies to support capabilities needed in future systems.
- Assist in Technology Transition Planning. TPIPTs will identify appropriate technology transition opportunities and assist Category A (PEO programs, i.e. C-17), Category B (non-PEO programs with multiple managers, i.e., F-117A), and Category C (non-PEO programs with one manager, i.e. SPD or

SPM with one DAC) IWSM programs. In addition TPIPTs will assist Center planners (i.e., XRs) and the laboratories in structuring milestones to meet transition need dates. The laboratories are responsible for working with the SPOs and XRs to define the details of Advanced Technology Demonstrations (ATDs) and for obtaining their coordination on Technology Investment Plans (TIPs), and Mission Area Plans as documented in the development plans. The TTO will oversee the accomplishment of technology application and insertion opportunities identified by the TPIPTs through the various insertion programs that it orchestrates (see Chapter 6).

- **Recommend Analysis and Evaluation Tasks.** The TPIPTs will identify significant operational concepts or technology issues requiring further analysis and evaluation by the operational user, laboratories, or other organizations. The study tasks should include the assessment of the value added and ability of technology insertion to resolve or mitigate system or operational problems or deficiencies. TPIPT representatives will participate in study definitions to ensure methodologies and assumptions to be used will support issues to be resolved through the planning process. In addition, TPIPT representatives will assist in structuring analyses to determine technology needs driven by different systems concepts and designs. Such analyses should identify supporting technologies common to more than one system and/or mission area.
- **Assist users in conducting Mission Needs Assessments (MNAs) and Mission Area Assessments (MAAs).**
- **Supporting Databases.** TPIPTs, with support from all stakeholders, will ensure that the necessary databases to support the development plans are developed and maintained. The databases should include descriptions of current and proposed systems, emerging system concepts and technology programs, operations concepts, system and concept architectures, and user requirements, threat capability projections, technology transition planning data, analyses of system and concept capabilities, and other information relevant to the plan development.

### **2.4.3 TPIPT Products**

The TPIPTs function continuously to define technology needs in the ongoing Need-to-Concept process as shown in Figure 2.4-2.



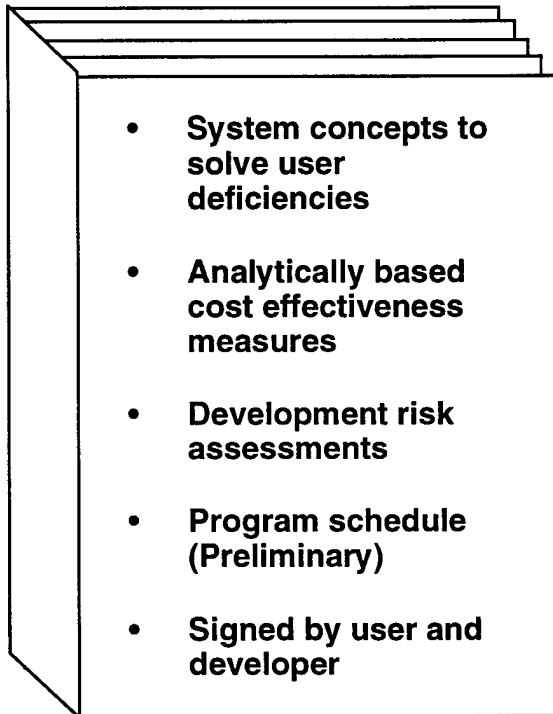
\*USED BY WARFIGHTERS TO DEVELOP SYSTEM REQUIREMENTS

**Figure 2.4-2 The Need-to-Concept Process**

As shown in Figure 2.4-3, a Development Plan will be prepared and maintained by the TPIPT. It will reflect 25 years of planned development to correspond to the timeline in the Mission Area Plan. It will identify and characterize the high payoff system concept alternatives to satisfy one or more user MAJCOM deficiencies in the MAP.

A prioritized Technology Investment Report or similar document as shown in Figure 2.4-3 will be published by each TPIPT on an annual basis to correspond with the laboratory budget /6.3 program planning time-lines. 1 October has been set as the date for publication which best fits the lab planning process. The report represents a snapshot in time and is updated throughout the year.

## Development Plans



## Technology Investment Recommendation

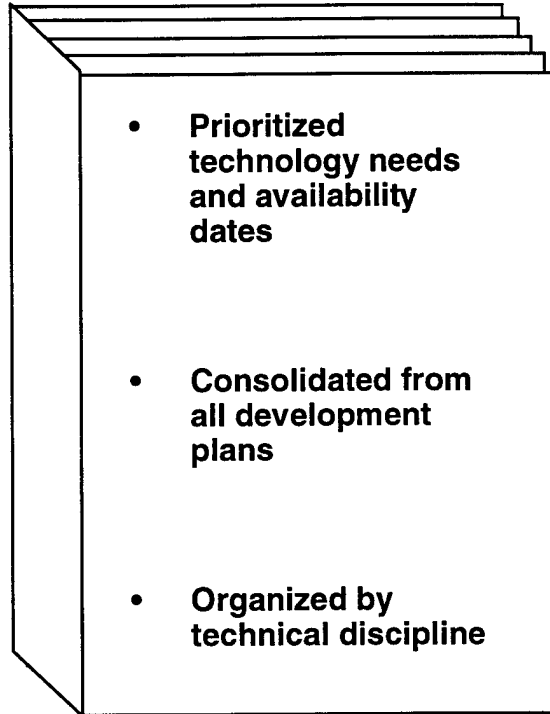


Figure 2.4-3 TPIPT Products

### 2.4.4 Current TPIPTs (As of 1 March 1994)

Established TPIPTs are shown below.

#### ASC:

**1. Base Operability / Defense** — Base operability, base defense, base level logistics, and combat support. ACC, AMC, and AFSOC are customers.

**2. Air-to-Surface** — Strategic attack/ interdiction and close air support/ interdiction. ACC is the primary customer.

**3. Special Operations** — The special operations mission. AFSOC is the primary customer.

**4. Mobility** — Airlift, air refueling missions, and C4I systems used for mobility missions. AMC is the primary customer.

**5. Aircrew Training** — The aircrew training mission support area including planning for training aircraft and aircraft simulators. AETC is the primary customer.

**6. Electronic Combat** — The electronic combat mission. ACC is the primary customer.

**7. CounterAir** — Offensive counterair, defensive counterair, and suppression of enemy air defense (SEAD) tasks. In addition, the TPIPT addresses the Combat Air-to-Air Identification mission support task. ACC is the primary customer.

**8. Combat Search and Rescue** — Combat rescue mission. ACC is the primary customer.

#### **HSC:**

**1. Environmental Safety and Occupational Health** — Mission support areas associated with the environment, safety, and occupational health. All Air Force commands are customers.

**2. Human Systems Integration** — Human-related mission support areas including human resources, aerospace medicine, life support, and crew systems. All Air Force commands are customers.

**3. Operational Medical Support** — Supports medical modernization planning for the Air Force Surgeon General. All Air Force Commands are customers.

#### **ESC:**

**1. Theater Battle Management** — The battle management mission including Theater Battle Management (TBM) and other C3 planning activities. ACC is the primary customer.

**2. Strategic Air Defense** — The strategic air defense mission associated with North American air defense. It includes warning systems, C4I, and air interceptors. ACC is the primary customer.

**3. Surveillance / Reconnaissance / Intelligence** — All aspects of the reconnaissance, surveillance, and intelligence missions. All Air Force operational commands are customers.

**4. Modeling/ Simulation** — Modeling and simulation tools that support the analysis and planning for all mission areas. All Air Force commands are customers.

**5. Weather** — Weather forecasting and reporting areas that support the air mission. All Air Force operational commands are customers.

## **SMC:**

- 1. Force Enhancement** — Communications and navigation mission areas. All Air Force operational commands are customers.
- 2. Space Support** — The space lift (launch) and satellite control missions. AFSPACECOM is the primary customer.
- 3. Missile Defense** — The planning and acquisition efforts associated with missile warning and theater missile defense. AFSPACECOM and ACC are the primary customers.
- 4. Strategic Deterrence** — The space component of the strategic deterrence mission (ICBMs). AFSPACECOM is the primary customer.
- 5. CounterSpace** — Space control and space surveillance tasks. AFSPACECOM is the primary customer.

## **2.5 INTERFACES**

**2.5.1 Inputs** — The TPIPTs involve participation and inputs from several sources as listed below.

**User** — TPIPTs will be a single interface to the user for evolving requirements and conceptional systems (pre-milestone I) and long range planning. The TPIPTs will use the users' MAPs as the basis for their technology recommendations. After a program office is formed, it will become the primary interface with the user for its system. The TPIPT will have networked membership from the program offices and will provide support for long range planning of major modifications and technology insertion opportunities. This TPIPT planning will not replace the system improvement planning being done by the program office, unless the program office requests the TPIPT to assume that role. The TPIPT will consolidate and document the program office planning in a mission/functional area context for the user and will assist the program offices and laboratories in identifying and integrating technology opportunities for the system. For existing systems, the TPIPT will coordinate all planning with the program office, through the program office member on the TPIPT (network).

**IWSMP / CMP** — The program offices will use the technology chapters of the Integrated Weapon Systems Master Plan (IWSMP)/Product Master Plan (PMP) / Materiel Master Plan (MMP) as capability requirement inputs to the mission area TPIPTs.

**AF Labs** — The Air Force Laboratories provide inputs to the TPIPTs in the form of Technology Transition Plans (TTPs) and roadmaps of other 6.2 and 6.3 efforts (TAPs, ATTDs, etc.). The laboratory technologist is the "expert" regarding related scientific activity and should advise the TPIPT on advancements in TPIPT related fields.

**TTO** — The Technology Transition Office (TTO) can provide inputs as a technology information broker.

**CTCs** — The CTCs will provide the TPIPTs with lists of validated weapon system technologies from Engineering / Validation. The CTCs may bring additional Mission Area requirements to the TPIPTs from their sustainment perspective.

**2.5.2 Outputs** — The mission area TPIPTs will provide two primary outputs as listed below.

**Development Plans** — The TPIPTs will publish mission or functional area plans which reflects 25 years of planned development and can be used in building the AFMC/ST S&T investment plan .

**Investment Recommendations** — The TPIPTs will publish an investment recommendations consistent with laboratory investment program planning time-lines, as a snapshot of known mission- or functionally-required technology needs.

## **2.6 DESIRED ROLES OF THE USERS**

The TPIPTs cannot be effective in facilitating an integrated developmental planning process without the full support and cooperation of the operational users. To support this process, the operational users will be asked to participate as active members of the TPIPTs and routinely provide their:

- Current requirements for system capabilities
- Insight into their operational tasks and strategies to be implemented through future systems
- Priorities for new or enhanced capabilities addressed in requirements documents
- Assessment of the effectiveness of proposed solutions to provide the capabilities consistent with their operations concepts and overall force structure objectives.

## **2.7 REFERENCES**

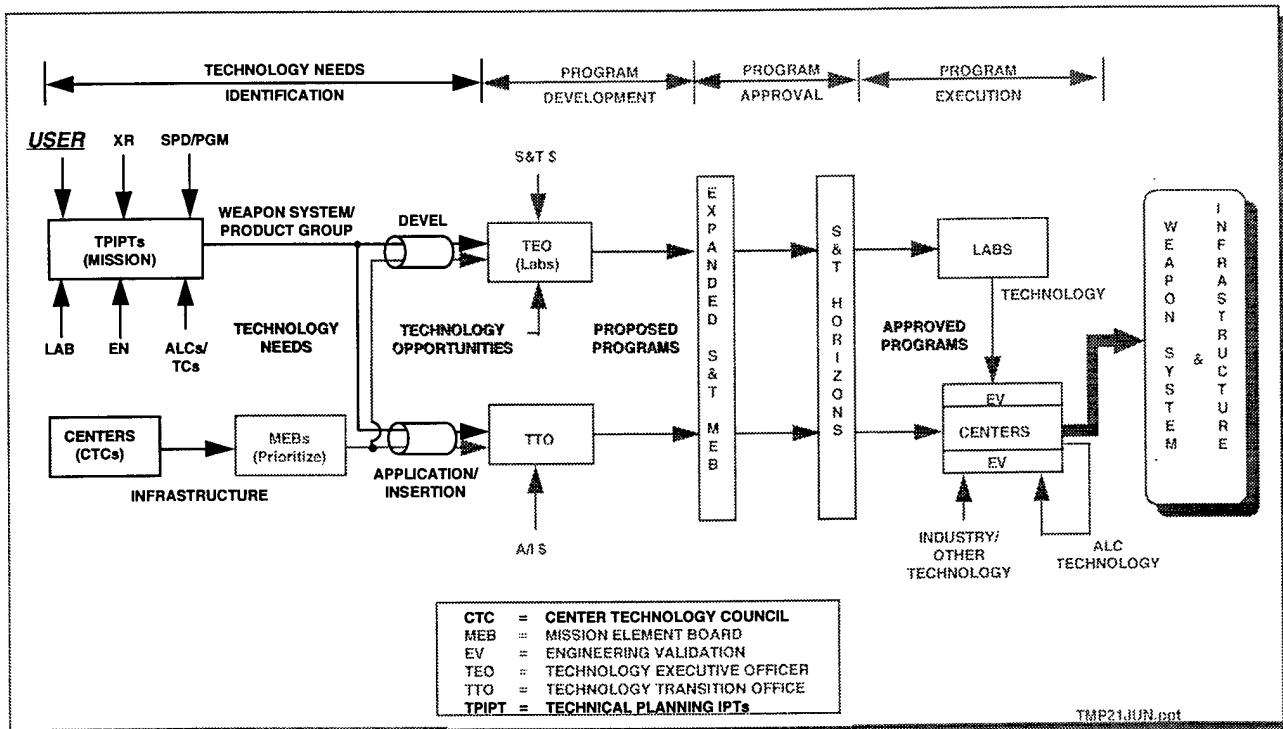
AFMCR 500-24 Technology Master Process  
AFMCI 61-XX (draft) Technology Master Process

## **2.8 POINT OF CONTACT**

HQ AFMC/XRX is the OPR for TPIPTs and will provide guidance as required.

# CHAPTER 3

## CENTER TECHNOLOGY COUNCILS



This chapter describes the center technology councils and their role in the Technology Master Process.



### **3.1 DESCRIPTION**

The Center Technology Councils (CTCs) are formed from within each of the product centers (ASC, ESC, HSC, SMC), air logistics centers (OC-ALC, OO-ALC, SA-ALC, SM-ALC, and WR-ALC), and test centers (AEDC, AFDTC, and AFFTC) with representatives from each of the centers' major areas of responsibility, product areas, weapon systems, etc. The CTCs are chaired by the center vice commanders or designated senior functional directors.

### **3.2 MISSION**

The mission of the CTC is to oversee the technology activities as a single point-of-contact for each Air Force Product Center (PC), Air Logistics Center (ALC), and Test Center (TC).

### **3.3 FUNCTION**

The CTCs are the single points of contact for all infrastructure technology activity at their center. As each center identifies needs, they are divided into two areas, technology development and application/insertion. Each center has a CTC activity which, among other technology related duties as assigned at the direction of the center commander, is responsible for looking across the center and aggregating infrastructure needs that could be met by technology solutions. This specific council activity is mandated by the TMP to facilitate the process to identify and aggregate infrastructure technology needs. The CTC process ensures that technology needs and solutions get broad and consistent application across the center community. An output of the CTC is a prioritized, funding-unconstrained list of needs to be addressed by the appropriate Mission Element Board (MEB) activity.

The CTC's list of infrastructure needs once identified and ranked in order of importance will be forwarded to the appropriate MEB activity (e.g., needs from the three test centers are prioritized by the T&E MEB, needs from the five ALCs are prioritized by the S&IO MEB, needs from the product centers are prioritized by the Product Management MEB, and environmental needs from across all centers are prioritized by the BOS MEB). The MEBs will then further aggregate, validate, and prioritize needs lists for technology funding. Those needs that can only be met by the development of new technology are sent to the laboratories to compete for S&T dollars. Those needs that can be met by the application/insertion of existing technology are either sent to the Technology Transition Office (TTO) to compete for technology application / insertion dollars, or are addressed internally via modernization and improvement projects for those mission elements (i.e., T&E) which have independent organic sources for engineering development dollars. The yearly status of the needs addressed by the S&T community will be reported at the annual Spring Reviews held by the laboratories. Metrics on the overall S&T program and how it has responded to the center needs will be reported at the S&T Horizons.

Since some of the infrastructure technology needs forwarded for resolution and funding will be categorized as technology development, the CTC will require close interaction with the laboratories and the TPIPTs. The overarching development activity is captured in the S&T investment plan and will be updated annually. The CTC serves as the center focal point for peculiar and pervasive infrastructure activities. These activities may be divided into several areas with respect to the TMP. Since the SPD has 3600 funding available for weapon system peculiar activity, that office should fund and manage the application / insertion efforts under IWSM. IF the weapon system peculiar or pervasive infrastructure activity is for new development and the SPD would like development support from the laboratories, the need should be coordinated with the appropriate TPIPT for insertion into the TMP.

The categorization of infrastructure determines how they are handled in the TMP:

<b>Infrastructure:</b>	<b>Tech needs for:</b>	
Weapon System Peculiar	Application/Insertion	IWSM as single manager (SDP/DAP/PEO) should fund with organic funding and coordinate the application of existing technology with the TTO.
	Development	If the effort is not within the SPOs PMD then the mission area TPIPT should submit the need into the TMP for S&T funding (6.1- 6.3A).
Weapon System Pervasive	Application/Insertion	An IWSM sponsor for the need should be found, if possible. If a sponsor cannot be found, then submit the need to the appropriate CTC for prioritization and subsequent evaluation by the Mission Element Boards. If the priority is high enough, the project will be funded in the TTO portfolio of programs.
	Development	The CTC should forward the need to the appropriate mission area TPIPT for prioritization and laboratory funding (6.1-6.3A).

## Activities

The CTCs will:

- (1) Formally assess the center's technological capabilities and forecast current and future requirements in consonance with the Center's technology plan.
- (2) Establish oversight and allocation processes, feedback controls, and metrics for the activities designated by the S&T Mission Element Board and provided through the TTO. These processes should be accessible, be simple, provide rapid customer feedback, and provide a single point of entry to the customer for technology insertion, transfusion, and transfer issues.
- (3) Identify and ensure establishment of infrastructure requirements necessary to support the attainment of technological goals identified in the technology plan.
- (4) Approve the technology insertion, transfusion, and transfer strategies for the center for those activities under the center commander's authority.
- (5) Make technology assignments within the center.
- (6) Review proposed funding requirements and allocate, within delegated authority, the funds to support the identified technology activities.
- (7) Provide input to the strategic planning activities for Weapon Systems, Products, and Materiel Program Offices by identifying technology opportunities and for the Science and Technology Programs (6.1, 6.2, 6.3A, and other) by stating technology needs.
- (8) Increase the center's commitment to investments in technology, i.e., advocate for proactive investments in technology insertion / transition / transfer.
- (9) Unify activities to assure funding through completion of projects.
- (10) Incorporate technologies as appropriate which have been identified by the engineering validation process.
- (11) Provide center's technology requirements to the MEB and TPIPTs.
- (12) Provide Technology Transition / Insertion project management for those project assigned to the Center by the TTO (e.g., PRAM, RAMTIP, FACTS...).
- (13) Confer with other CTCs to avoid duplication of effort.

### 3.4 INTERFACES

**3.4.1 Inputs** Several inputs are required for the CTCs to function properly:

**TPIPTs** — The TPIPTs provide the mission area and mission support development plans and their associated technology needs.

**IWSMP / PMP / MMP** — The Integrated Weapon System Master Plans (IWSMPs), Product Master Plans (PMPs), and Material Master Plans (MMPs) provide the CTCs with weapon system-specific and pervasive technology requirements.

**Program Offices** — The program offices provide the CTCs with infrastructure technology requirements, funding, status of projects executed by the program office, and the IWSMP.

**Eng/Val** — Engineering validation provides the CTCs with a list of validated technologies, to include the limits of those technologies.

**TTO** — The TTO provides the CTCs PMD-like direction, planning data, proposal evaluation results, funding allocation guidelines, a conferring forum, and an updated listing of validated technologies.

**Labs** — The labs provide future technology opportunities.

**3.4.2 Outputs** — The CTCs also provide outputs as described below.

**Outside Transfer** — The CTCs provide pervasive and infrastructure technology to the Technology Transfer Integrated Product Team for outside transfer.

**Eng / Val** — The CTCs provide engineering validation with descriptions of proposed technology products.

**Program Offices** — The CTCs provide the program offices with requirements and opportunities.

**TTO** — The CTCs provide the TTO with metrics, technology reports, requirements, proposed projects, and strategic / corporate plans.

**TPIPT** — The CTCs provide the TPIPTs with requirements, proposed projects, technology reports, and strategic plans.

**Labs** — The CTCs may fund laboratory projects and will provide technology requirements to the labs.

### **3.5 FUNDING**

The CTCs identify their long-term technology needs through the MEBs to HQ AFMC/ST where the needs are incorporated in the S&T investment plan. The TTO then forwards funding to the centers through conventional methods.

### **3.6 TECHNOLOGY TRANSITION/TRANSFER**

Technology transition to other agencies within the Air Force is handled through interaction between the CTC focal point for technology transfer and the TTO. Technology transfer to agencies outside the Air Force is handled through the Office of Research and Technology Application (ORTA) located in each of the particular centers: product, logistics, and test. The ORTAs will interact with the CTCs.

### **3.7 MEMBERSHIP RECOMMENDATIONS**

Individual CTCs should include senior technical representatives from the center directorates.

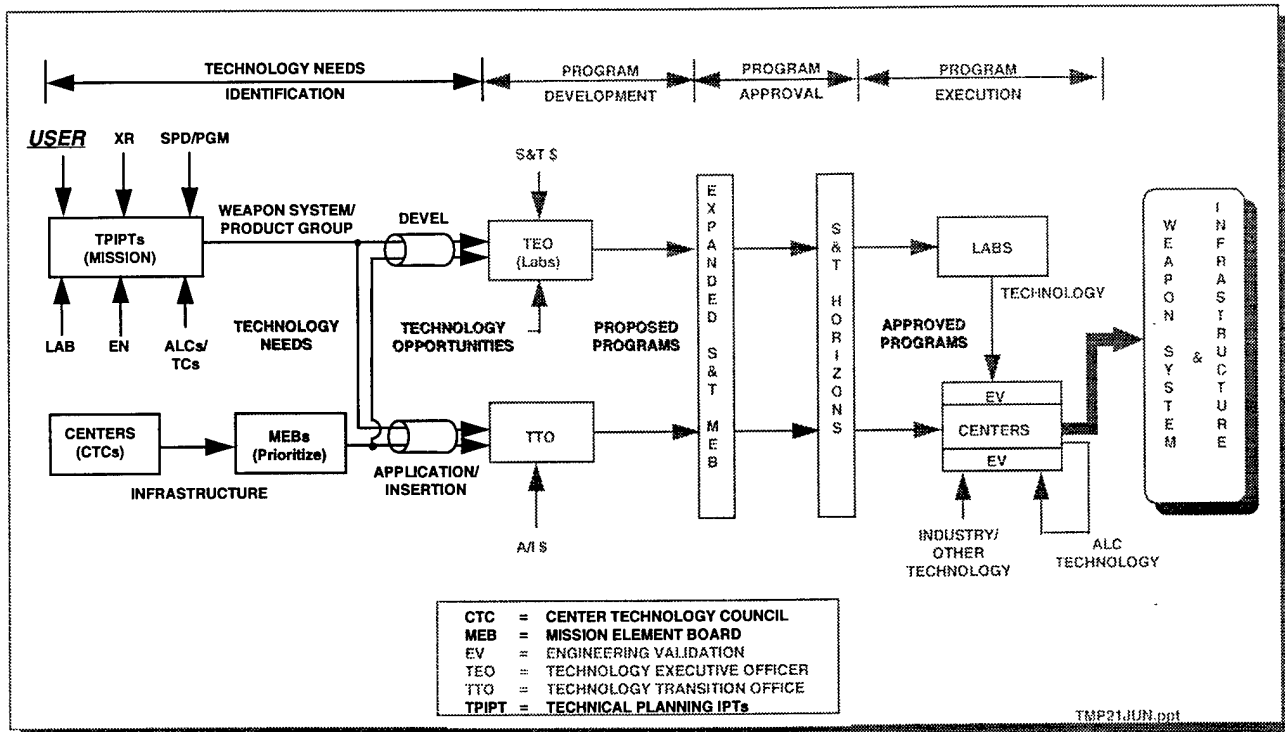
### **3.8 POINT OF CONTACT**

HQ AFMC is responsible for the MEBs which correspond to the various mission areas of interest to the centers. Specific focal points at HQ AFMC are as follows:

Product Centers	HQ AFMC/XR
Logistics Centers	HQ AFMC/LG
Test Centers	HQ AFMC/DO

# CHAPTER 4

## MISSION ELEMENT BOARDS



This chapter describes the operation of the Mission Element Boards that interface with the Center Technology Councils at the product centers, test centers, and air logistics centers.

## **4.1 DESCRIPTION**

A key component of the TMP is the Mission Element Board (MEB). There are the five MEBs that manage AFMC's infrastructure requirements process. They cover the following areas:

- Product Management
- Support and Industrial Operations
- Science and Technology
- Test and Evaluation
- Base Operating Support

## **4.2 PURPOSE**

The purpose of the MEBs is to aggregate, integrate, and prioritize infrastructure needs identified by the Center Technology Councils. The MEBs ensure consistency and provide AFMC a mission area perspective.

## **4.3 FUNCTION**

Each MEB evaluates the prioritized lists of infrastructure and process improvement needs from the Center Technology Councils. The MEB prioritizes the needs and develops one combined prioritized list related to its mission area.

### **AFMC Command Structure**

AFMC is led by three major types of decision-making bodies: the Corporate Board (primary decision-making body which meets five times annually at the Horizons conference), the five Mission Element Boards (which provide support to the Corporate Board), and the AFMC Council. These bodies provide guidance for the following five mission elements shown with their two-letter Offices of Primary Responsibility (OPRs). Figure 4.3-1 shows the relationships among the Corporate Board composed of the heads of the two letter offices, the AFMC staff, and the five MEBs.

### **Five AFMC Mission Elements**

- Product Management (XR)
- Support and Industrial Operations (LG)
- Science and Technology (ST)
- Test & Evaluation (DO)
- Base Operating Support (CE).

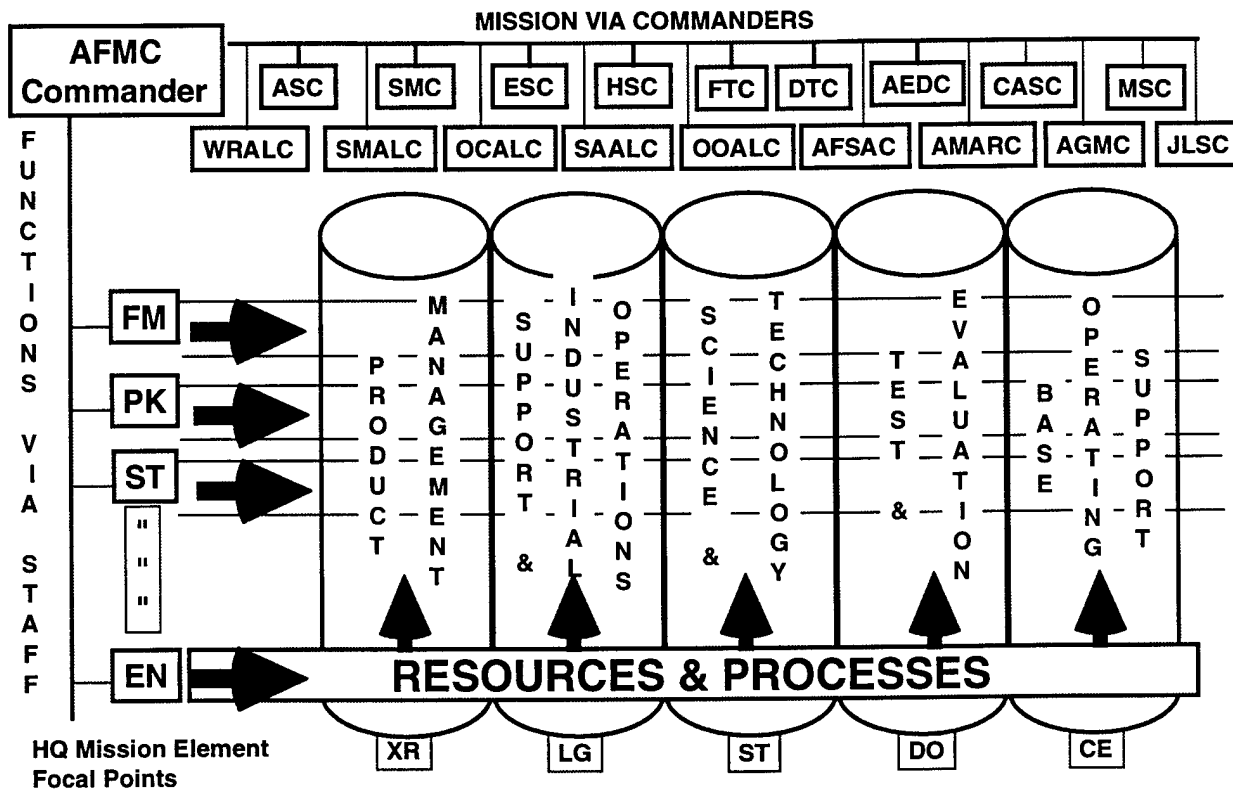


Figure 4.3-1 AFMC Command Management Framework

## 4.4 FUNCTIONAL DESCRIPTIONS

The role of each MEB within the command is expanded in the following descriptions:

### 4.4.1 Base Operating Support MEB

The BOS MEB is responsible for developing recommendations and actions to sustain and improve all aspects of base operating support services, operations, and processes to support the command mission, goals, and objectives. These base support services and processes include:

Personnel services: career development, education and training, personnel management changes, and work force mix.

Supply and equipment support: management of base supply and operations, maintenance and repair of vehicles, and communications/computer systems.



Facility and real property support: operations, maintenance and repair of facilities, utilities, roadways, and airfields.

Environmental: pollution prevention, installation restoration, compliance, and waste disposal minimization.

Quality of life and support services: legal, finance, budget, operational contracting, information management, historical research, religious programs, family support, community relations/ public awareness activities, on and off base family and unaccompanied housing, health care, safety, security, child development/care, and recreational and leisure time programs.

#### **4.4.2 Test and Evaluation MEB**

The mission of the T&E MEB is to contribute timely, accurate, and affordable information to decision makers to support weapon system life cycle decisions. This is done through disciplined application of the test management process while supporting the command goals and objectives. The T&E MEB is responsible for test and evaluation needs and issues relating to the mission element within the command. The MEB reviews the technology needs identified by the test community and serves as the overseeing body for the Technology Committee composed of representatives from AFFTC/CA, AFDTC/CA, AEDC/CN, SMC/Det2/CA, and any other center that has test needs. The Technology Committee prioritizes the test technology needs into a single T&E needs list which is then approved by the T&E MEB and documented in the AFMC Test Investment Strategy Plan (TISP).

#### **4.4.3 Product Management MEB**

The PM MEB is responsible for the management activities related to developing, procuring, and supporting USAF products (major weapon systems, military systems, product groups, or material groups) and for program management mission element strategic planning. The PM MEB prioritizes all program management opportunities for improvement and ensures needs are addressed with consistency within the AFMC mission area. The fundamental purpose of the PMMEB is to support Single Managers (system program directors, product group managers, and material group managers), by providing the appropriate policies, processes, assistance, and management tools needed to facilitate and improve the acquisition process.

The PM MEB works through Product Management Focal Points (PMFPs) who serve as the working group for the PM MEB. Each center has a PMFP assigned it who works through the center PM MEB member. The PMFPs act as the interface between Single Managers and the PMMEB, ensuring two-way understanding and communication of issues /actions and overseeing the creation, implementation, and continuous improvement of the program management process.

#### **4.4.4 Science and Technology MEB**

The S&T MEB provides a forum for deliberating AFMC corporate issues that pertain to the Air Force S&T program which leads to sustained technological superiority. The S&T MEB functions within the framework of the AFMC Strategic Planning System and focusses on training / organization / equipment issues, objectives, processes, and metrics in support of all aspects of the AFMC S&T Mission Element. The MEB is chaired by the Technology Executive Officer (TEO), the Director of Science and Technology at HQ AFMC/ST. The MEB includes both core and associate members. Core members will attend all meetings of the MEB and associate members are invited to attend all meetings and may attend at their discretion. The core membership includes representatives from each of the Air Force laboratories, AF Office of Scientific Research, the Technology Transition Office (TTO), and the Director of Science and Technology (SAF/AQ). The Air Force Chief Scientist is an ex-officio member of the S&T MEB and is invited to all meetings of the MEB. Associate members include representatives from:

- (1) Air Logistics Centers
- (2) Product Centers
- (3) Test Centers
- (4) Other Centers including AGMC, AFMARC, AFSAC, CASC, and MSC.
- (5) HQ AFMC : CE, CI, PK, EN, FM, LG, DP, XP, XR, DO, IN, IA, and JA.

The Expanded S&T MEB is described in chapter 7.

#### **4.4.5 Support and Industrial Operations MEB**

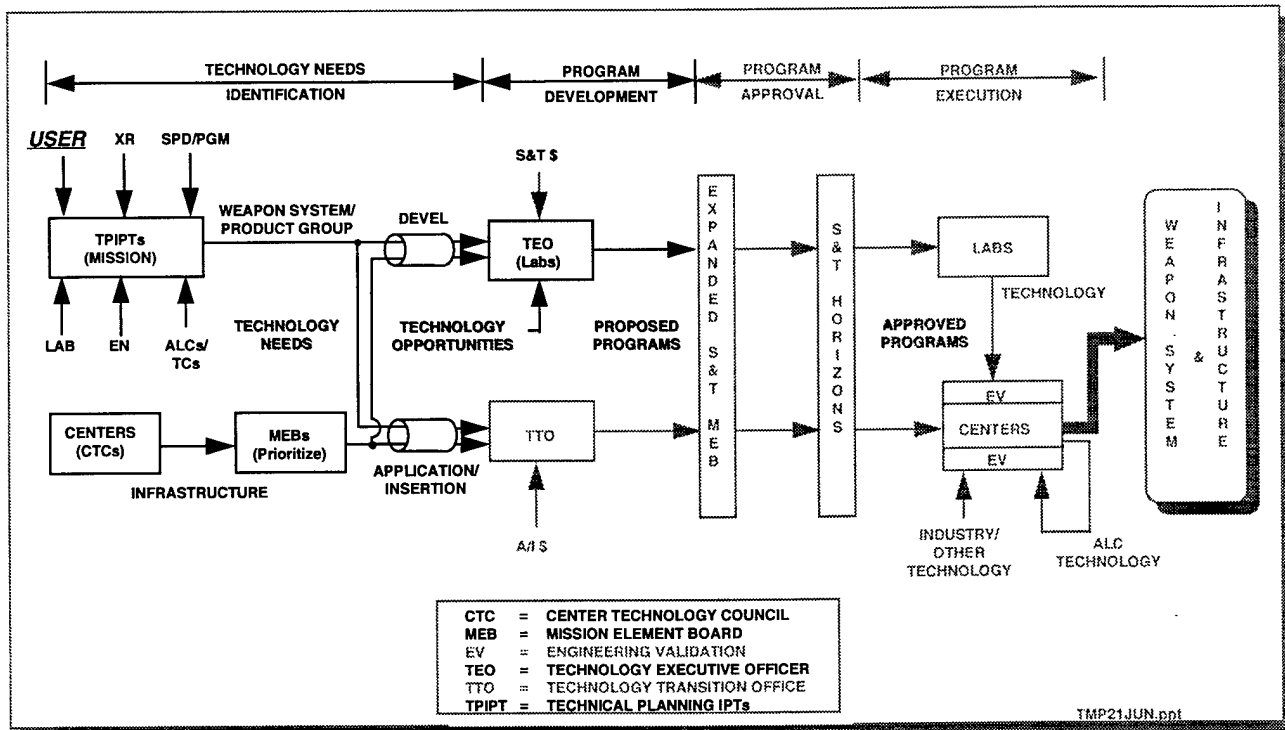
The S&IO MEB is the responsible HQ AFMC body for the review of infrastructure needs that relate to the capability and capacity of Air Force industrial sites (Air Logistics Centers primarily) to provide extended combat support by maintaining the state of readiness of Air Force weapon systems through repair and scheduled depot maintenance. Capital funding programs are compiled in the unified capital investment strategy that is reviewed and approved by the S&IO MEB.

### **4.5 FUNDING**

HQ AFMC is responsible for all travel and administrative support costs associated with the Mission Element Boards.

# CHAPTER 5

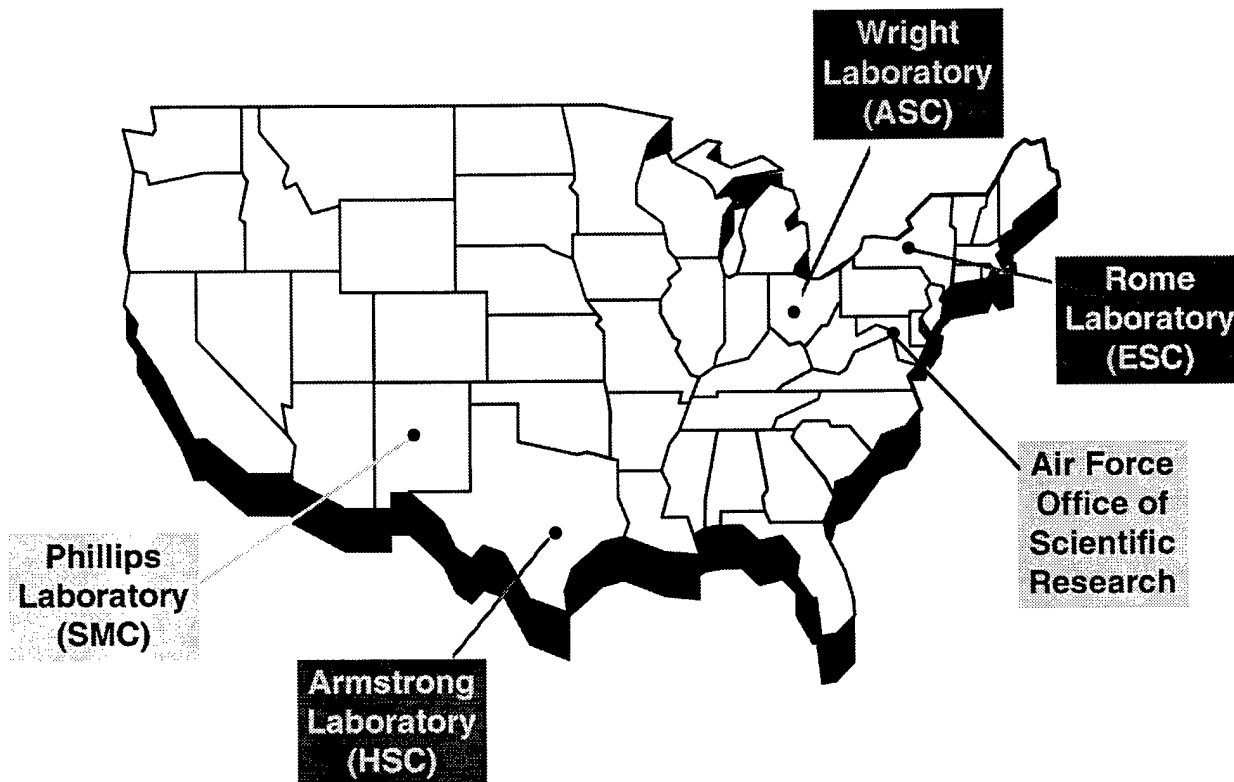
## LABORATORY PROGRAM DEVELOPMENT



This chapter describes the role of the Air Force laboratories in executing programs to satisfy the technology needs described in the AFMC Strategic Plan.

## 5.1 DESCRIPTION

The four Air Force product-aligned laboratories — Wright Lab (Wright-Patterson AFB, OH), Armstrong Lab (Brooks AFB, TX), Rome Lab (Griffiss AFB, NY), and Phillips Lab (Kirtland AFB, NM) shown in Figure 5.1-1 will be responsible for executing development programs required to satisfy weapon system / product group technology needs.



**Figure 5.1-1** Geographic Locations of Air Force Laboratories

## 5.2 OBJECTIVE

The objective of the Air Force laboratories is to prove and mature the technologies identified as necessary to meet both the short-range and long-range goals of the Science & Technology (S&T) Strategy thrusts.

### 5.3 FUNCTION

Air Force S&T represents the “venture capital” for developing technology options for the future Air Force. To deliver the greatest value from these expenditures, we continue to seek to leverage Air Force S&T investment by ensuring we do not unnecessarily duplicate research being done by others. A primary customer for the laboratories is industry, since industry will be the one to actually develop the technologies into usable products.

AFMC is pursuing innovative ways to enter into Cooperative Research and Development Agreements (CRDAs) with industry and academia. These agreements not only reduce the cost of military research, but enhance the global competitiveness of U.S. products and services.

Pursuing the right technology is not in itself sufficient to achieve technological superiority. It is equally critical to transition proven technologies to systems that can prevail in combat. Each of the four laboratories have a specific “product” orientation. This “product” orientation has proven to be effective in coordinating the work of scientists and engineers to transition technologies to new or existing systems. In addition, the laboratories are represented on the TPIPTs to facilitate the strategic planning and transition of technology to programs and alternative system concepts.

The four Air Force Laboratories are part of the scientific and technical management organization shown in Figure 5.3-1. The laboratories and AFOSR get their funding and S&T investment direction from the TEO; however, the laboratories report to their respective product centers as shown. AFOSR reports directly to the TEO.

Armstrong Lab (AL) — Human Systems Center (HSC)  
Phillips Lab (PL) — Space and Missile Systems Center (SMC)  
Rome Lab (RL) — Electronic Systems Center (ESC)  
Wright Lab (WL) — Aeronautical Systems Center (ASC)

Figure 5.3-2 shows the relationship among the categories of programs under the 3600 appropriation, the primary source of laboratory funding.

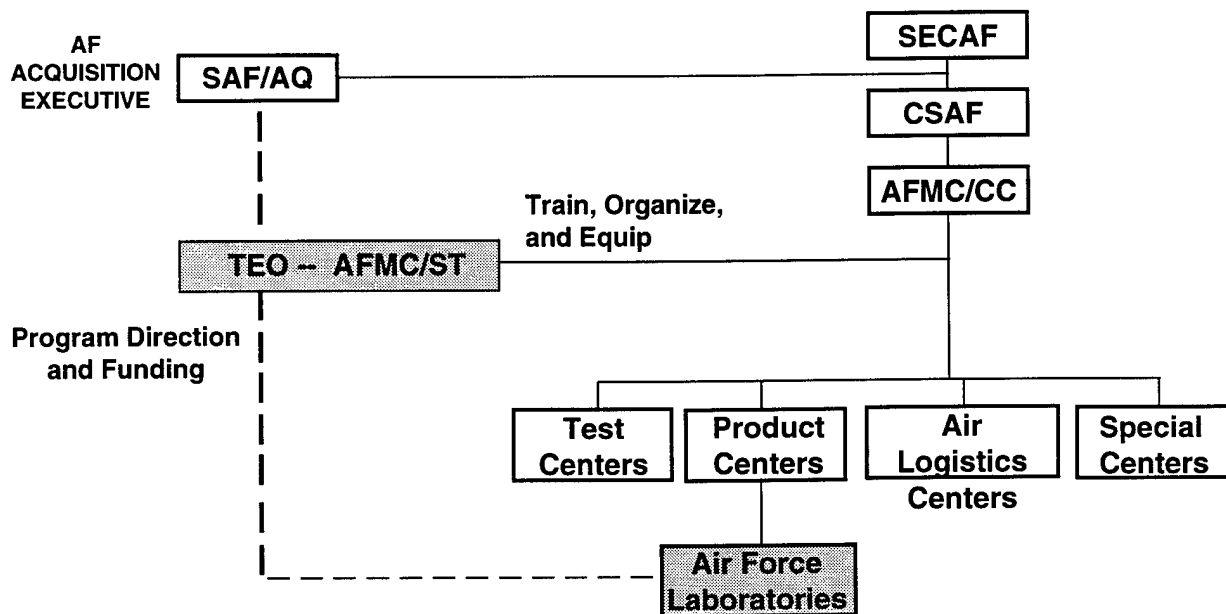


Figure 5.3-1 Science and Technology Management Structure

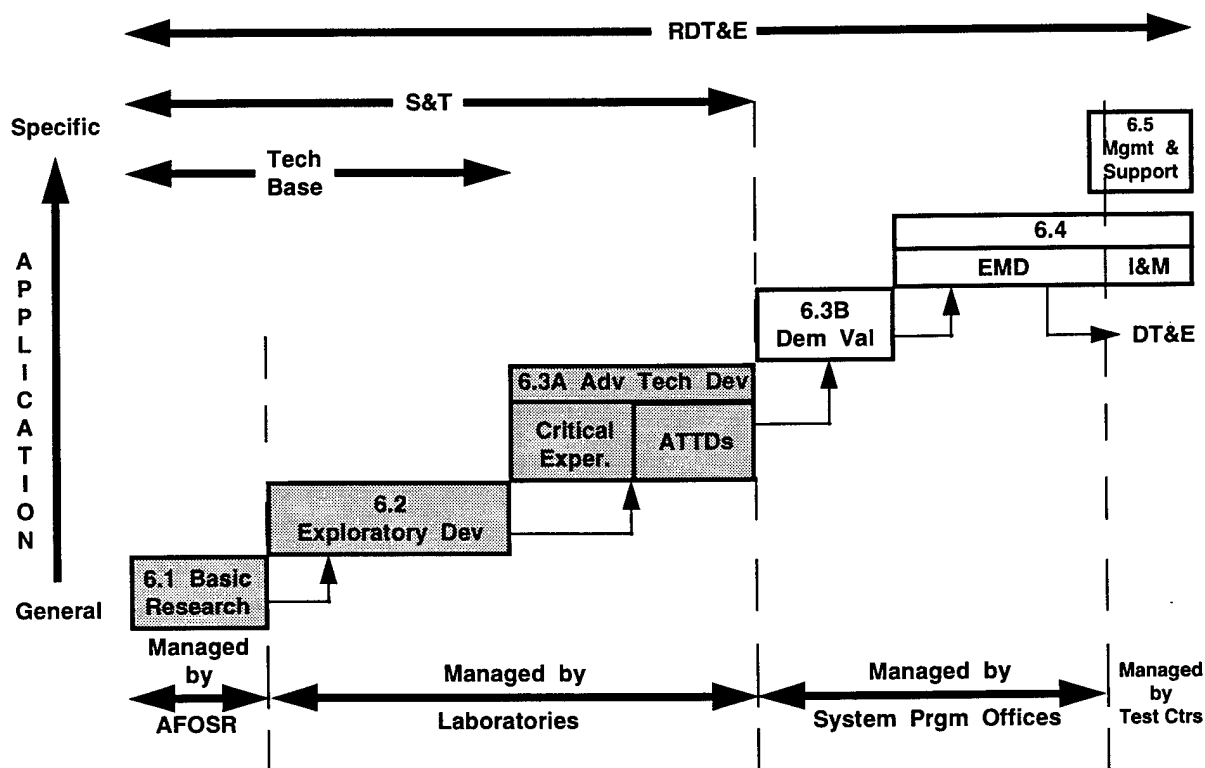


Figure 5.3-2 Program Categories under 3600 Appropriation

The program categories shown in the figure are described below in definitions extracted from AFI 65-601 Vol 4 (3600) dated 30 November 1993, page 84.

6.1 Provides for research, development, test, and evaluation associated with operation and management of Air Force Laboratories whose primary mission is research in support of Defense Research Sciences and Exploratory Development. It includes studies of all types to acquire fundamnetal knowledge in areas of physical, mathematical, engineering, environmental, materials, and life sciences. 6.1 research is conducted by both universities on the post-doctoral level and Air Force laboratories.

6.2 Provides for research, development, test, and evaluation of programs that relate to the exploration of alternatives and concepts before development of specific weapon systems. 6.2 research attempts to apply military utility to a specific technology.

6.3 Provides for research, development, test, and evaluation of strategic, offensive, and defensive systems in advanced, full-scale engineering and operational systems development. The Science and Technology community breaks down the 6.3 category further as follows:

6.3A Advanced development and critical experiments. 6.3A activity attempts to refine basic and exploratory research and demonstrate the military utility of a technology prior to hand-off to the engineerring community or program offices. The originating laboratory writes a Technology Transition Plan (TTP) which is, essentially, a "contract" between the laboratory and its customers, e.g., EN, program office, and MAJCOM. The TTP contains the technology transition criteria which was agreed to by the customers prior to being accepted.

6.3B Advanced development for specific applications either by the Air Force engineering community or program offices. 6.3B activity usually occurs in the Concept Definition phase and engineering validation usually takes place at this stage.

6.4 Provides for research, development, test, and evaluation of tactical development programs in advanced, full-scale engineering and operational development. 6.4 projects are usually accomplished at product center program offices for a specific application.

## **5.4 INTERFACES**

**5.4.1 Inputs** — The laboratories receive inputs from many sources as shown.

**TEO** — The TEO provides both the funding and guidance for the laboratories.

**IWSMP/PMP/MMP** — The Integrated Weapon System Master Plans (IWSMPs), Product Master Plans (PMPs), and Materiel Master Plans (MMPs) provide the laboratories with the short and long-range weapon-specific and pervasive technology requirements.

**Industry** — Industry provides feedback to the laboratories on the technologies initially developed by the labs for application by industry.

**TPIPTs** — TPIPT interface with the laboratories is critical as the technology needs resulting from identified deficiencies are documented in development plans with the active participation of the laboratories. The needs are prioritized by the TPIPT and are forwarded to the laboratories through HQ AFMC/ST (TEO).

**5.4.2 Outputs** — The laboratories provide outputs to other functions within the TMP as shown.

**Program Offices** — The laboratories provide the weapon system, product, and materiel program offices with new technology alternatives and Advanced Technology Transition Demonstration results that can be applied to meet weapon system-specific and pervasive technology needs.

**Engineering Validation** — The laboratories assist as necessary during Center validation of technologies to assure that the technologies are mature and ready for application.

**Industry** — The laboratories provide industry with information and feedback on technology developments resulting from in-house work and contracted efforts.

**Outside Transfer** — The laboratories provide agencies outside the Air Force with technologies for application in commercial and other defense areas.

## **5.5 FUNDING**

S&T funding for the laboratory comes directly from the TEO; however some funding is also received from outside sources such as ARPA and other services. Guidance for 6.1 projects is very general due to the nature of the basic research and funding is managed by AFOSR. Guidance for 6.2 projects is more structured and specific, but funds are still directly managed by the laboratories. Guidance for 6.3 projects is much more structured and specific in order to tie a program to a specific customer. Funds for a 6.3 project are managed by the laboratories; however, the projects must also have the support of the user to assure that the affected technologies will transition to the user for application development. The laboratories are not generally involved in 6.4 funded full scale engineering development programs managed by product center program offices.

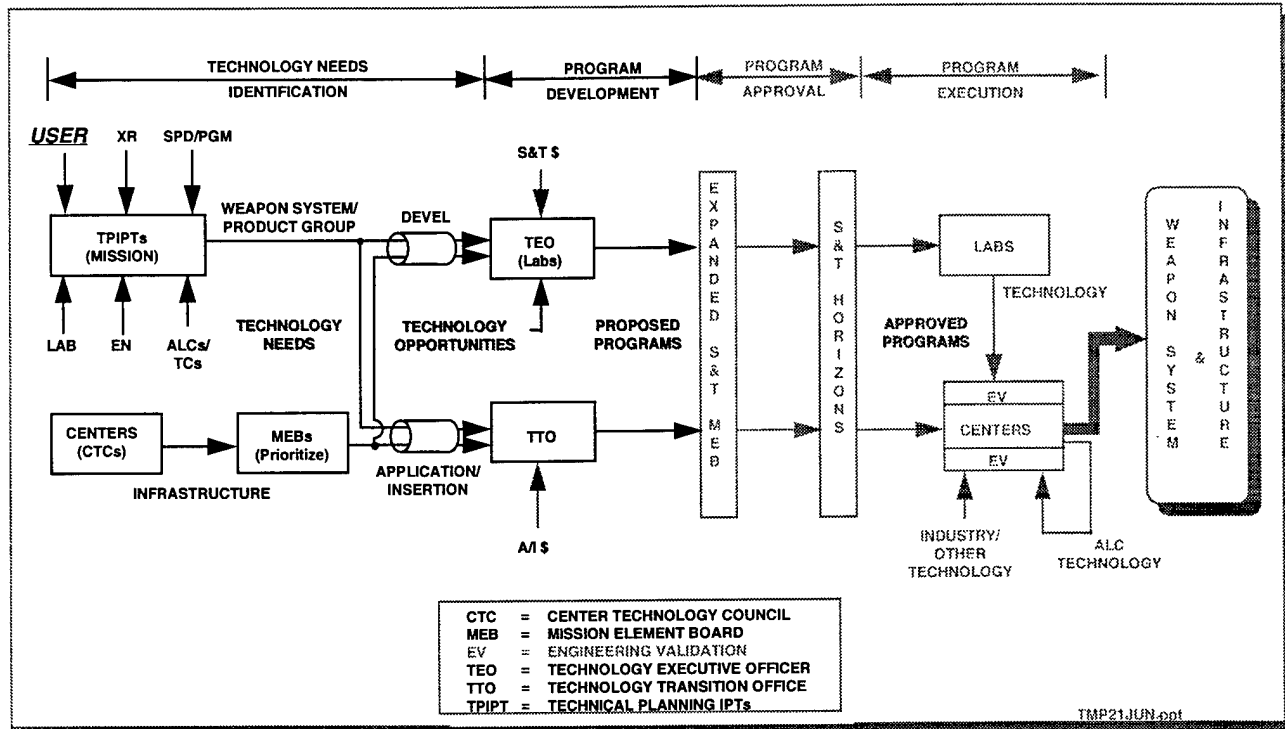


## **5.6 TECHNOLOGY TRANSITION / TRANSFER**

Technology transition within the Air Force for non-weapon system specific technologies is handled through the TTO. Technology transfer to agencies outside the Air Force is handled through the Office of Research and Technology Application (ORTA) located in each of the Air Force laboratories and in each of the centers. The ORTA at each operating location offers assistance in identifying the appropriate vehicles (i.e., Cooperative Research and Development Agreements (CRDAs), patent licensing, Small Business Innovative Research, Independent Research and Development, exchange programs, alliances, etc.) that allow transfer and comply with public law. In addition, ORTAs will provide members to the Transfer Integrated Planning Team. Chapter 10 explains the technology transfer process in greater depth.

# CHAPTER 6

## TECHNOLOGY TRANSITION OFFICE



This chapter provides a detailed description of the Technology Transition Office (TTO) in the Technology Master Process.

## **6.1 DESCRIPTION**

The Technology Transition Office (TTO) is assigned as a Field Operating Agency (FOA) within AFMC and is the focal point for technology application, insertion, transition, and transfer. The TTO is the clearinghouse for technology information for Air Force product centers, logistics centers, test centers, laboratories, and industry. The TTO Director reports directly to AFMC/ST.

## **6.2 MISSION**

The TTO mission is to:

- (1) Provide integrated management of AFMC technology insertion/application programs
  - Orchestrate budgeting, planning, selection, and execution
- (2) Serve as the AFMC technology information manager or clearing house
- (3) Facilitate and coordinate AFMC technology transfer activities

## **6.3 FUNCTIONS**

To accomplish its mission, the TTO will perform the following functions:

- (1) Technology Transition Program Oversight
- (2) Technology Information Brokerage
- (3) Technology Transfer Program Integration.

### **6.3.1 Technology Transition Program Oversight**

The TTO oversees the management of selected technology transition programs, integrates and submits center requirements to the Expanded S&T MEB (emphasizing planning for infrastructure and pervasive technologies), and participates in the advocacy process for technology transition funding.

Project management/execution will be delegated to organizations external to the TTO through the CTCs. The TTO will allocate available funds for technology insertion projects that address infrastructure, pervasive, multiple weapon system or multi-application products or materiel as dictated by the approved AFMC S&T investment plan. The TTO customer base includes the MAJCOM customers, laboratories, PCs, ALCs, TCs, other Services, and other government organizations.

The TTO will be responsible for program oversight of selected technology transition programs as well as tracking, overseeing, and monitoring technology transition projects; and sharing status information.

### **6.3.2 Technology Information Brokerage**

To function as a technology information broker, the TTO will involve the customer, industry, technology developer, and other DoD agencies/technology sources to obtain, store and disseminate appropriate technology information — be a technology information clearinghouse, including monitoring other non-TTO technology transition efforts.

The TTO will facilitate awareness of high-leverage technologies through a comprehensive information network involving industry, centers, laboratories, MAJCOM customers, other services, and other government agencies. The TTO will monitor technology transition activities within PCs, LCs, and TCs to be cognizant of, store, and share technology transition success stories and lessons learned. A major function of the TTO is to perform as a technology information broker and to help the customer find alternative technology solutions to approved requirements.

The TTO will consolidate and perform a library function (storage, retrieval, and research) for technology information (technology transition lessons learned, technology sources/providers, technology customer needs, and validated technologies).

The TTO is the single POC to the technology customer (including MAJCOM users) to contact when dealing with AFMC for technology transition information, interfacing with all TPIPTs, addressing technology transition requirement consistency and alignment across mission area and functional TPIPTs

The TTO will maintain a technology transition information base and coordinate/share efforts with the Defense Technical Information Center and other scientific technical information offices, as appropriate

### **6.3.3 Technology Transfer Program Integration**

Technology Transfer is the movement of technology (knowledge, products, processes, facilities, etc.) from the Air Force to other federal agencies, industry (large and small), academia, and state and local government agencies. The TTO serves as the chair of the Technology Transfer Integrated Product Team which consists of all AFMC ORTAs (Office of Research and Technology Application).

## 6.4 INTERFACES

The TTO interfaces with PCs, ALCs, TCs, TPIPTs, MAJCOM customers, laboratories, DOD and government agencies, and industry as shown in Figure 6.4-1. The TTO will establish MOAs and other strong ties with Army, Navy, and joint activities where its mission dictates.

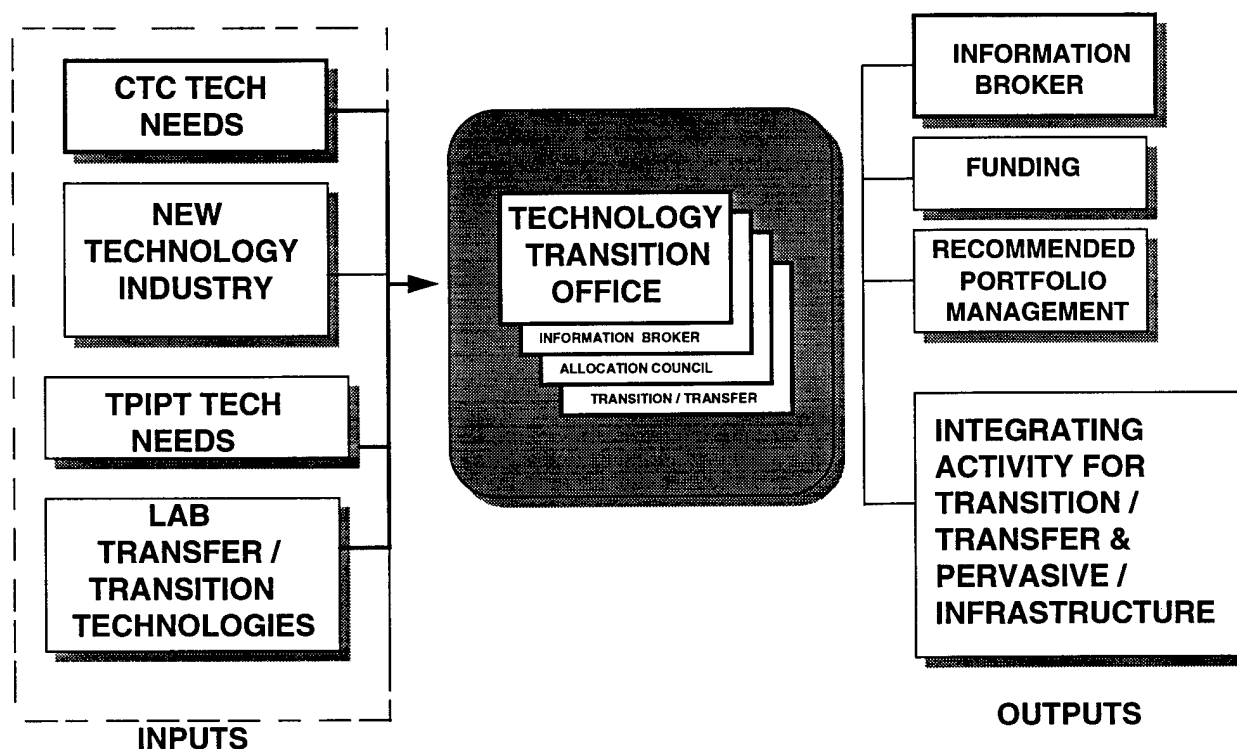


Figure 6.4-1 Technology Transition Office Interfaces

### 6.4.1 Inputs

The TTO receives inputs from several sources as described below:

**Mission Element Boards** — Mission Element Boards provide the technology transition direction for the TTO and the technology transfer direction for the Technology Transfer Integrated Product Team within the TTO.

**TEO** — The TEO provides guidance and/or direction to the TTO on matters pertaining to the Air Force laboratories.

**Industry** — Industry informs the TTO of new technologies available for use throughout the Air Force.

**IWSMP / PMP / MMP** — The TTO will review the technology chapter of the Integrated Weapon Systems, Product and Materiel Master Plans for possible uses of Air Force technology either internally, through technology transition, or externally, through technology transfer.

**Laboratories** — The Air Force laboratories provide the TTO with information on technologies for transition within the Air Force. They also provide the Technology Transfer Integrated Product Team within the TTO with information on technologies for transfer outside the Air Force.

**Engineering Validation** — The Eng / Val process at the Centers will provide the TTO with a list of validated technologies from both Air Force and industry sources.

**Center Technology Councils** — The CTCs will provide infrastructure and pervasive technology requirements to the TTO through the TMP. TTO provides funds to the CTCs for planned infrastructure and pervasive technologies according to the technology transition direction approved by the Expanded S&T Mission Element Board.

**TPIPTs** — The TPIPTs will provide information to the TTO on upcoming requirements.

#### **6.4.2 Outputs**

The TTO will provide information and funds to the following:

**Laboratories** — The TTO gives information to the laboratories on other technologies being developed or used both from within the Air Force and from industry.

**Centers** — The TTO distributes funds to the product, logistics, and test centers by specific Program Element according to the approved technology transition direction for infrastructure and pervasive technology requirements.

**Mission Element Board** — The TTO provides feedback to the Mission Element Board on the infrastructure and pervasive technology programs/processes being funded by the Board.

**TPIPTs** — The TTO will have information available on infrastructure and pervasive technologies for the TPIPT's.

**Industry** — The TTO provides information to industry about Air Force laboratory technologies either emerging or in work and solicites information from industry on technologies that may be of use to the Air Force.

## **6.5 SUMMARY**

The establishment of the TTO has resulted in several major improvements:

- The TTO provides program oversight for all non-IWSM Technology Transition activities. The TTO provides a unified approach for Technology Transition within AFMC
- The TTO is the AFMC information broker for all technology transition activities. It collects Technology Transition information from Labs, SPOs, Centers, other Services, the MAJCOMs and industry and provides a single source of such information to all command customers
- The TTO oversees the Technology Transfer activities in AFMC by chairing the Technology Transfer Integrated Product Team, comprised of the ORTAs at each center.

HQ AFMC/ST is now responsible for technology development and technology transition. The TEO, through the Air Force laboratories, is charged to develop the technologies. Moreover, the TEO, through the TTO, is charged to transition those technologies which are not associated with a specific weapon system, e.g., pervasive, commodity, or infrastructure.

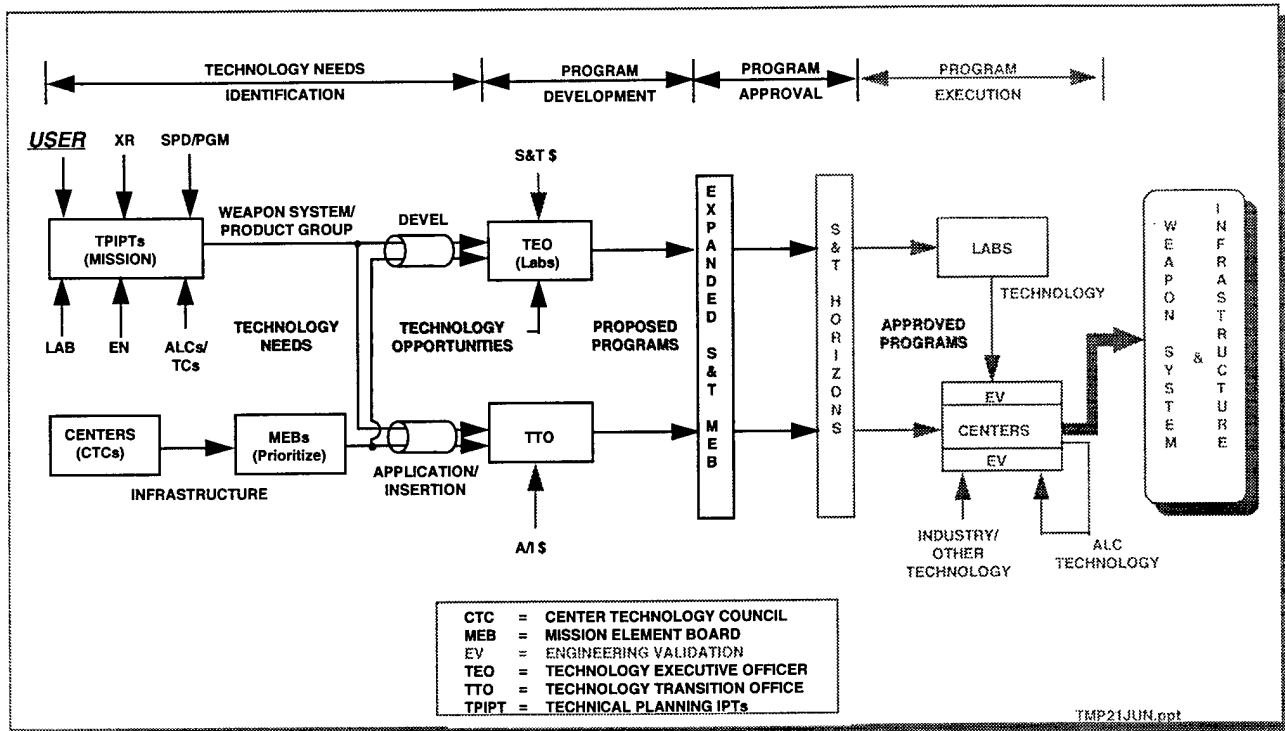
Further guidance is provided by DoD Instruction 5000.2, Part 5, Section D, Technology Transition and Prototyping, which establishes DoD policies and procedures for technology transition and prototyping in defense acquisition programs.

## **6.6 REFERENCES**

AFR 172-1 Air Force Budget Manual (Volume I)  
DoD Instruction 5000.2 Defense Acquisition Management Policies and Procedures

# CHAPTER 7

## EXPANDED SCIENCE AND TECHNOLOGY MISSION ELEMENT BOARD



This chapter describes the role of the Expanded Science and Technology Mission Element Board in the Technology Master Process.



## 7.1 DESCRIPTION

The Expanded Science and Technology (S&T) Mission Element Board (MEB), consisting of senior MAJCOM representatives, AFMC MEB chairpersons, and Functional Element Board chairpersons, reviews the full portfolio of proposed technology development and technology application / insertion projects

## 7.2 PURPOSE

The Expanded S&T MEB recommends a set of technology development projects to the Technology Executive Officer (TEO) for his approval and subsequent execution by the laboratories. The Expanded S&T MEB also recommends a set of technology application/insertion projects for execution by AFMC Centers. The entire portfolio of recommended technology projects constitutes the AFMC S&T investment plan.

## 7.3 FUNCTION

The Expanded S&T MEB is one of the critical elements of the TMP. It reviews and approves a proposed set of dollar-constrained programs for technology development (from the TEO) and for technology application/insertion (from the TTO). The proposed technology programs that form the S&T investment plan reviewed by the Expanded S&T MEB are documented in two technology areas:

- (1) Technology development briefed by the laboratories (documented in the Technology Area Plans).
- (2) Technology Application/Insertion Plan (prepared by the TTO)

The S&T investment plan is the summation of these briefings presented to the Expanded S&T MEB by the ST staff, laboratories, and the TTO for review / approval.

## 7.4 INTERFACES

**7.4.1 Inputs** — The Expanded S&T MEB receives inputs from the following sources:

**Mission Element Boards** — The recommendations provided by the MEBs form the basis of the Expanded S&T MEB's recommendations to the TEO and direction/funding to the TTO.

**AFAE and Air Staff** — Major Air Force technology thrusts and concerns are input by the AFAE and Air Staff to the Expanded S&T MEB in preparation for the S&T Horizons conference.

**TTO** — The TTO provides information to the Expanded S&T MEB on the technology application/ insertion programs and processes.

**TEO** — The TEO provides a proposed set of technology development programs to the Expanded S&T MEB for review.

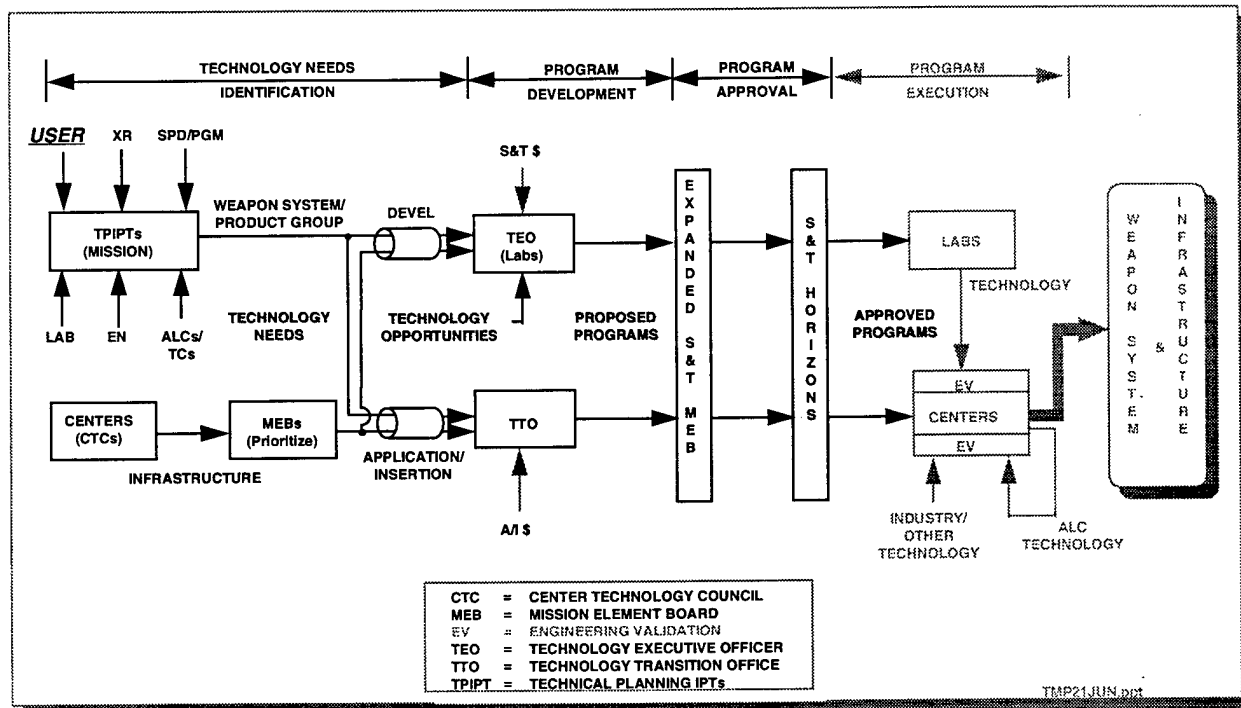
**7.4.2 Outputs** — The Expanded S&T MEB provides the following outputs.

**Labs** — The Expanded S&T MEB makes recommendations to the Labs regarding the list of technology development programs to be undertaken to satisfy the technology needs identified by the TPIPTs.

**TTO** — The Expanded S&T MEB provides recommendations to the TTO regarding the technology application / insertion programs to be accomplished by the centers.

# CHAPTER 8

## SCIENCE AND TECHNOLOGY HORIZONS



This chapter includes the description of role of the Science and Technology Horizons conference as it relates to the approval of the technology investment plan developed by the Expanded S&T MEB.

## **8.1 DESCRIPTION**

The AFMC Corporate Board, the main decision making body for the AFMC leadership, convenes five times each year at the "Horizons" conference. Each of the two day conferences examines AFMC matters on the first day and specific concerns for one of the five mission elements during the second day. The Expanded S&T MEB reports the technology investment plan to the AFMC Corporate Board at the S&T Horizons.

## **8.2 PURPOSE**

The purpose of the Science & Technology (S&T) Horizons is to provide AFMC Corporate Board review of the approved portfolio of technology projects and overall investment strategy guidance for the next budget cycle.

## **8.3 FUNCTION**

The Corporate Board and Mission Element Boards are directly responsible for translating and expanding the Air Force Vision into AFMC tenets through the AFMC strategic planning process which is flexible, durable, and pervasive. The strategic planning process is composed of three interrelated functions: command planning, mission element planning, and corporate review. The output from the Corporate Board is an AFMC Strategic Plan which is a living document, updated as necessary, to reflect the overall direction of the AFMC and the individual mission elements. The Strategic Plan includes one chapter for each of the individual mission elements. Actual command accomplishments against this Strategic Plan are measured in an annual Corporate Report.

### **S&T-Specific Interaction**

Interaction between the AFMC leadership and the TMP occurs at the S&T Horizons conference in April of each year. The April meeting date was chosen to coincide with the Air Force Program Objective Memorandum (POM) cycle. Support for the conference is provided by the S&T mission element board and a HQ AFMC/ST secretariat. Output from the conference includes an updated AFMC Strategic Plan which is integrated with the program office POMs.

The S&T chapter of the AFMC Strategic Plan provides guidance for the AFMC S&T program, from basic research through technology transition and transfer. The chapter includes the following three plans: S&T, Technology Transition, and Technology Transfer. The S&T Plan provides guidance for the Air Force laboratories. The Technology Transition Plan provides direction for the program offices and centers. Finally, the Technology Transfer Plan provides direction for the Technology Transfer IPT within the Technology Transition Office (TTO).

## **8.4 INTERFACES**

**8.4.1 Inputs** The Corporate Board receives inputs from the following sources.

**Expanded S&T MEB** — The proposed technology programs coordinated through the Expanded S&T MEB are the primary inputs to be reviewed by the corporate board.

**AFAE & Air Staff** — Major Air Force technology thrusts and concerns are input by the AFAE and Air Staff to the Corporate Board and considered during the Horizons conference.

**8.4.2 Outputs** The Corporate Board provides the following outputs.

**AFMC Strategic Plan** — The Corporate Board provides the technology chapter to the AFMC Strategic Plan.

**Program Offices** — The Corporate Board provides the weapon systems, products, and materiel program offices with feedback on their technology requirements.

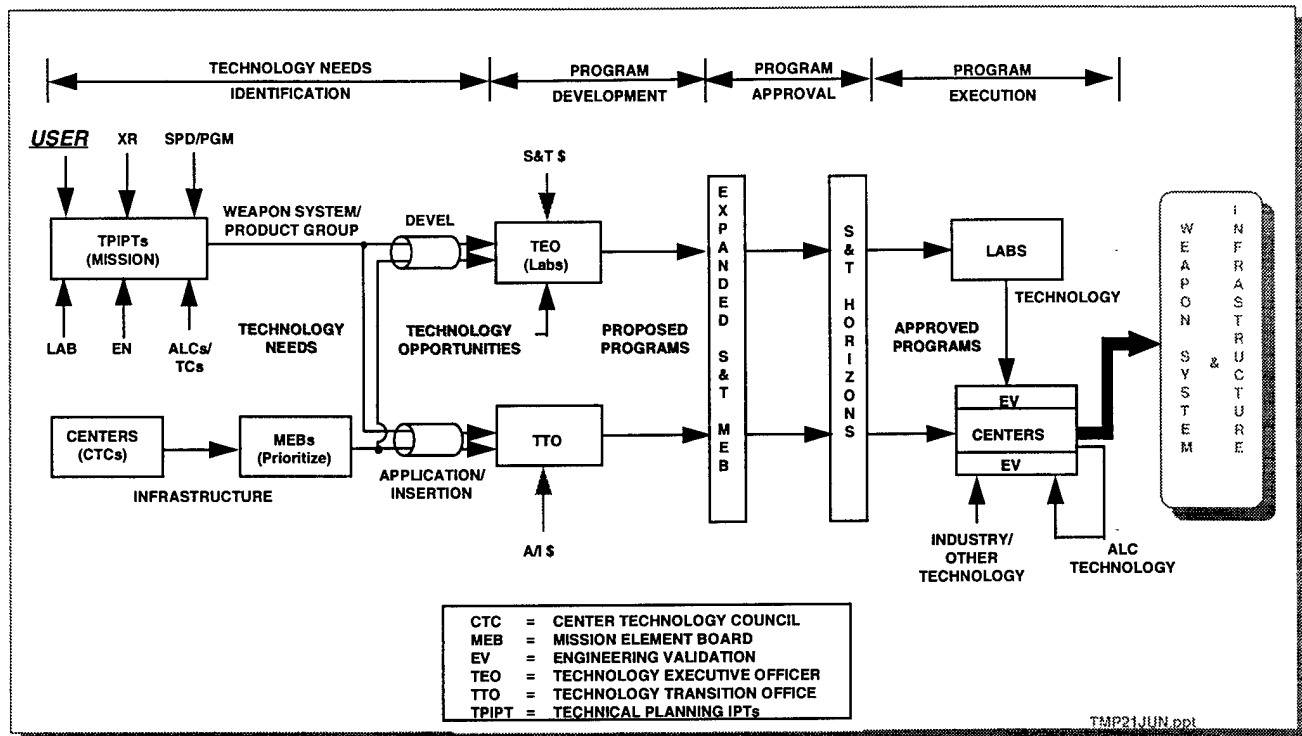
**Expanded S&T MEB** — The Corporate Board provides the Expanded S&T MEB with feedback on the approved portfolio of programs and the allocation of the funding for the individual program elements within the TTO.

## **8.5 FUNDING**

HQ AFMC is responsible for all travel and administrative support costs associated with the Corporate Board.

# CHAPTER 9

## ENGINEERING VALIDATION



This chapter discusses the role of the product, test, and air logistics centers in assuring that technology to be applied meets applicable criteria for maturity and performance.

## **9.1 DESCRIPTION**

Engineering Validation (EV) is the confirmation that a given technology is suitable for further refinement, application, or use at acceptable risk as established by a specific Mature Technology Summary (MTS) for the primary purpose of either solving an operational deficiency or reducing life cycle cost. The validation process is accomplished by Product Centers, Logistics Centers, and Test Centers.

## **9.2 PURPOSE**

The purpose of EV is to facilitate transition of new technology from the Air Force Laboratories and other sources to Air Force Center organizations for use in one or more of the stages of planning, development, design, and test and evaluation for new weapon systems or modifications to fielded systems. The EV process provides an institutionalized methodology for effective and timely transition of newly developed technologies. The two objectives of the EV process are as follows:

(1) Evaluate developing and / or newly developed technology and assess the risk associated with its generic/target application. The assessment will assure that the development is sufficiently mature or remaining risks are identified and deemed acceptable for transition to new or fielded systems and command infrastructure.

(2) Document the validation of technologies to facilitate accurate dissemination of technology information for use within DoD and by commercial industry.

## **9.3 FUNCTION**

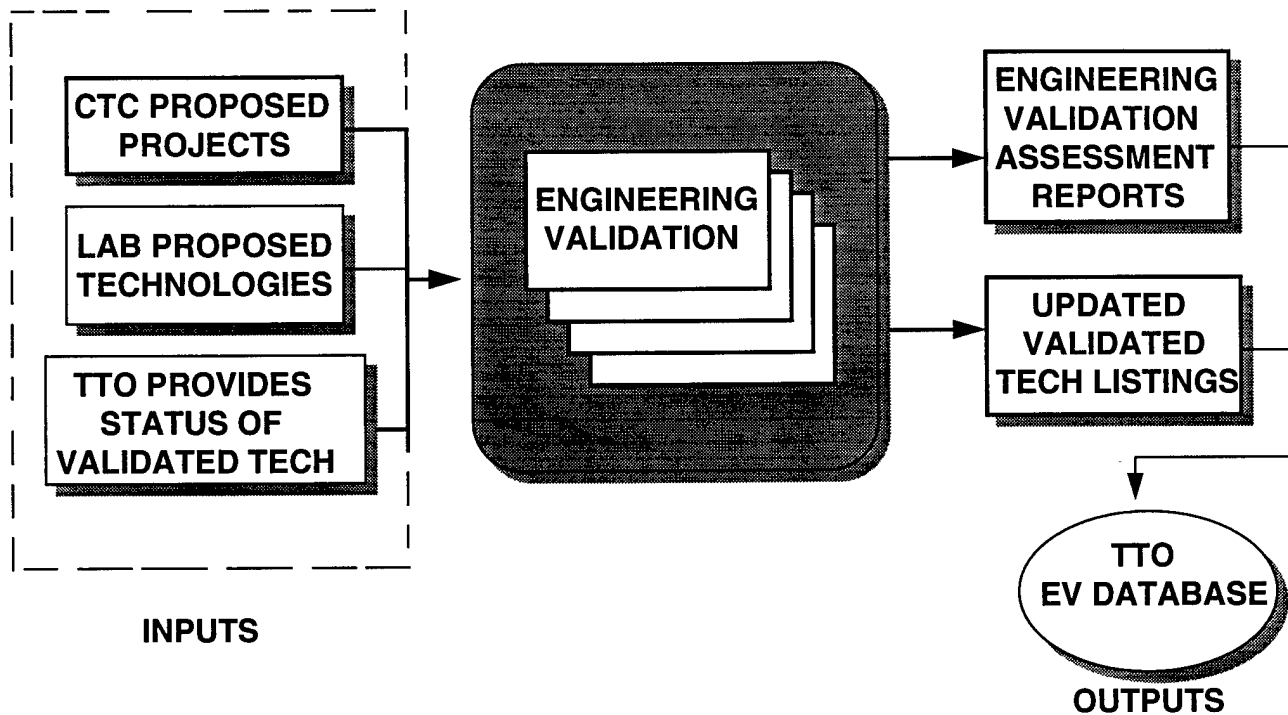
The three components that make up the EV process are :

- (a) Validation of Air Force developed technologies.
- (b) Validation of Industry developed technology or in-house developed technology applications that have not been previously validated by the Air Force.
- (c) Dissemination and storage of technology information by the TTO.

Each of the components are discussed in the following sections:

### 9.3.1 Validation of Air Force Developed Technologies

Figure 9.3-1 shows the general components of the validation process within the Air Force. The technologies to be validated can originate from needs identified by the CTCs or the TPIPTs.



**Figure 9.3-1** Engineering Validation Inputs/Outputs

The following description of the EV process flow (shown in Figure 9.3-2) is a rigorous implementation for a laboratory technology. There are other EV applications where a simplified approach may be more appropriate as long as the intent of EV as outlined in Section 9.2 is met. This description assumes that:

- (a) The TPIPTs have identified a need for a 6.3A Advanced Technology Development Program
- (b) The potential for a viable, needed PE 6.3 Technology Development Program exists, and
- (c) The CTCs have reviewed the technology need.



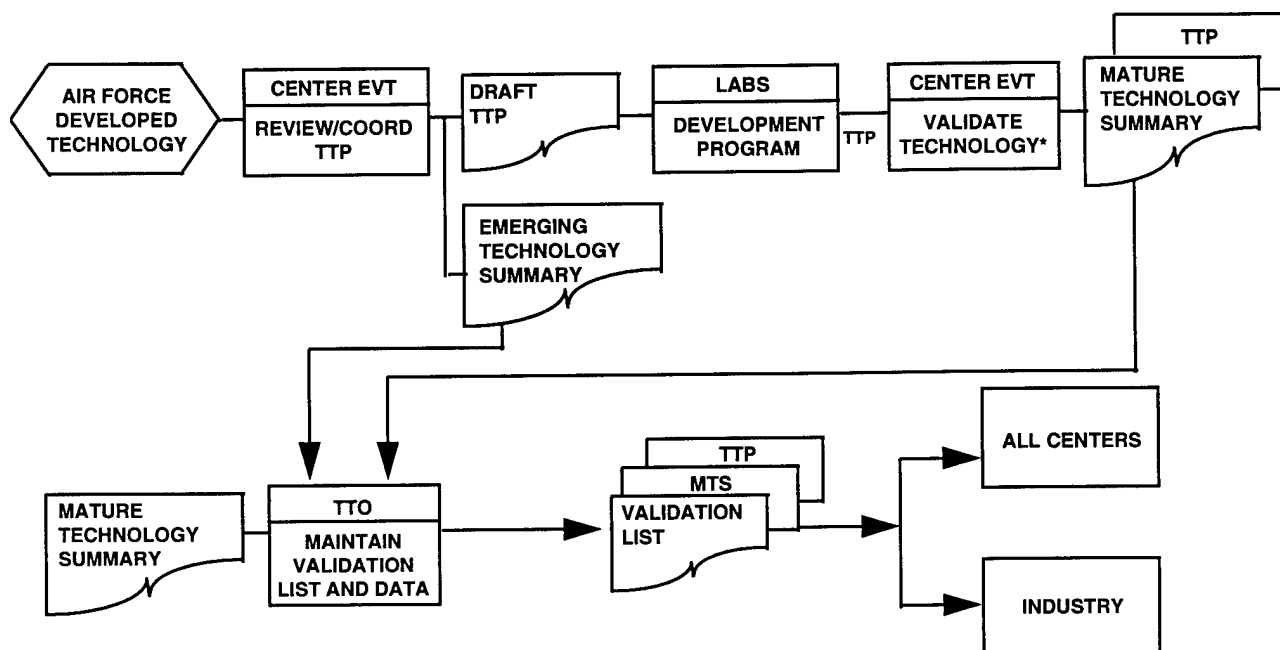


Figure 9.3-2 Engineering Validation of Laboratory Technology

The engineering validation process starts when the responsible Air Force laboratory prepares a draft Technology Transition Proposal (TTP). HQ AFMC/ST requires that all Advanced Technology Demonstration (ATD) programs include a TTP. Critical Experiments will have TTPs when directed by the responsible Air Force laboratory commander. Other Air Force Laboratory programs will have TTPs as determined by the laboratory responsible for the program and the Air Force organization which will receive the program's technology product. The TTP must include a section on "Transition Criteria". The TTP must also include sufficient specific information to clearly reflect "exit criteria" for the laboratory program and thus ensure accurate engineering validation.

Upon determination that a TTP is needed, the laboratory forms a Technology Transition (T2) Team consisting, as a minimum, of the laboratory program manager, a Center Engineering Validation Team (EVT) assigned Responsible Technology Transition Engineer (RTTE), and a representative of each organization which will be a recipient of the program's technology. The T2 team is responsible for preparing and updating the TTP as required and coordinating the document with the laboratory and the EVT.

The laboratory completes a one-page Emerging Technology Summary (ETS) for transmittal to the TTO based on the approved TTP. When the laboratory completes the development of the new technology, it prepares a draft Mature Technology Summary (MTS) and requests EVT validation of the technology. The EVT validates the technology using the Engineering Validation Assessment Checklist (EVAC) as a guide.

### 9.3.2 Validation of Industry Developed Technology

Much of the new technology introduced with new Air Force systems is developed by industry under contractual obligation as part of the system acquisition process. As an inherent part of system acquisition, the system engineering / configuration management process with its many technical/engineering reviews will normally serve to accomplish the essence of EV. There may be occasions when the SPD, upon the advice of the supporting engineering staff, requests validation by a center EVT as shown in Figure 9.3-3. For example, a particular technology may be critical to the success of the program, the risk is judged to be high and there is clear need to mitigate the risk.

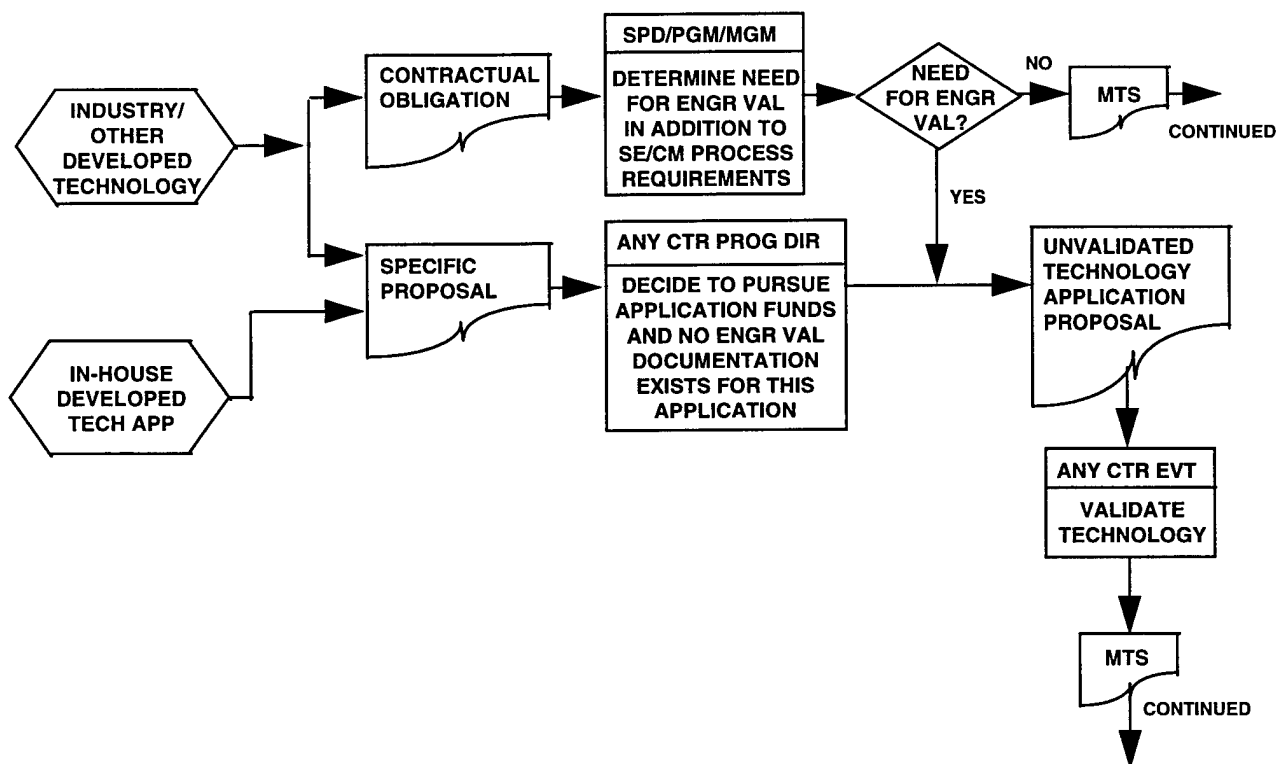


Figure 9.3-3 Validation of Industry / Other Developed Technology

MTS documentation will be prepared for the TTO on all newly matured technologies even though they have not undergone the EV process by a T2 team.

### 9.3.3 Dissemination and Storage of Technology Information by the TTO

Once the TTP has been approved and again when the MTS has been signed, the TTO will make summary information available to facilitate technology transfusion within DOD and to facilitate transfer of the technology for use by commercial industry. The TTO will provide MTS and points of contact within the centers and laboratories to qualified customers.

## **9.4 INTERFACES**

**Air Force Laboratories** — The laboratory drafts the TTP and manages the T2 team that includes representation from the appropriate center EVT. The ETS and the MTS are outputs of the laboratory managed process.

**Center** — The EVT, formed and managed from within the appropriate center, approves the TTP, the ETS, and the MTS when the technology has been validated.

**Commercial Industry** — Commercial industry may be involved in the validation of industry developed technology as part of the systems engineering / configuration management process associated with acquisition. Industry has access to information on mature technologies by requesting the MTS from the TTO.

**Technology Transition Office** — The TTO stores and disseminates the technology information documented with the MTS to both the centers and industry.

## **9.5 FUNDING**

The program executing the engineering validation will provide the funding. Any additional costs required to support the validation will be provided by the program requesting the validation.

## **9.6 REFERENCES**

AFMC INSTRUCTION 61-X (Draft) Engineering Validation of New Technology

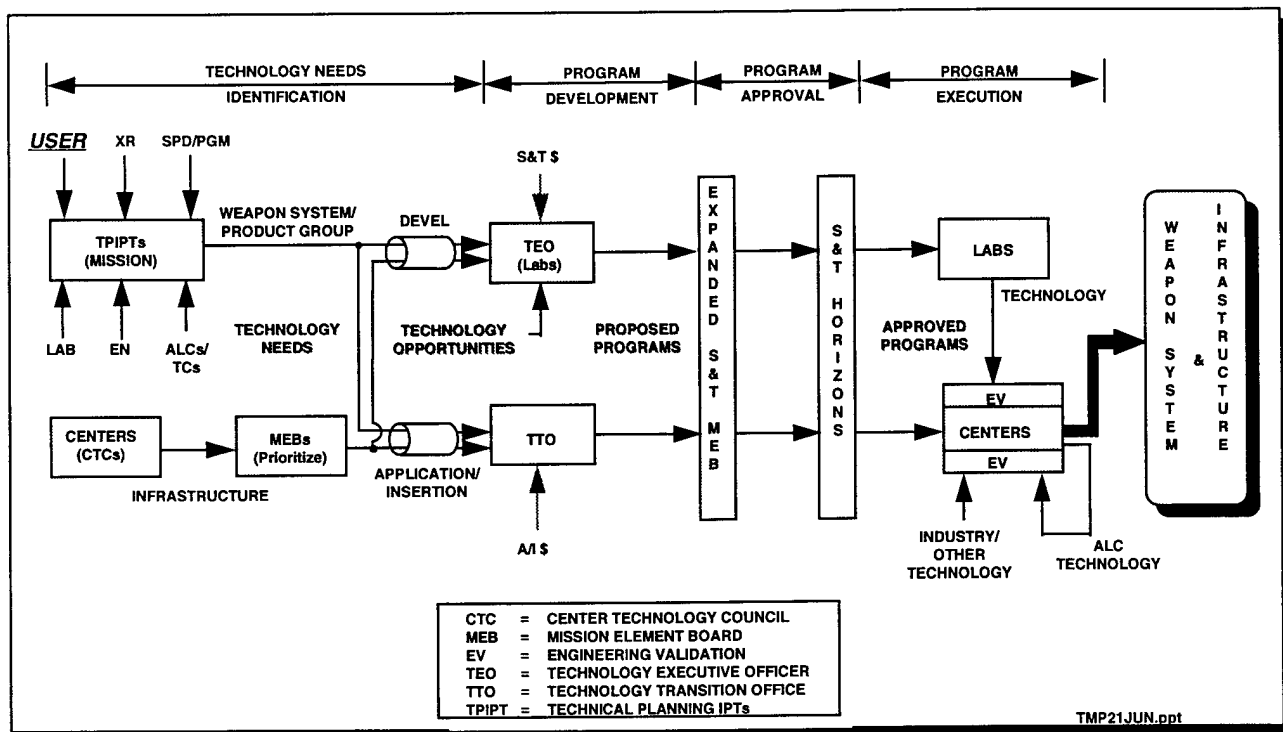
AFMCR 500-6, dated 1 July 92 AFMC Commander's Policy "Sustain Technological Superiority"

## **9.7 POINT OF CONTACT**

HQ AFMC/ENST is the OPR for Eng/Val

# CHAPTER 10

## TECHNOLOGY TRANSFER



This chapter describes the technology transfer process and refers the reader to the Technology Transfer Handbook for additional information.

## **10.1 DESCRIPTION**

The technologies developed by the Air Force will solve many of the national defense problems that face our nation. However, many of the technologies also have utility and application beyond the Air Force. Our country's industries, academia, and state and local government agencies can greatly benefit from sharing our technical knowledge and expertise. We call that sharing of Air Force technology with the private sector as "technology transfer".

AFMC has an energized technology transfer process developed by a command-wide process action team (PAT). This process addresses technologies that exist in our laboratories and product, test, and logistics centers. The technology transfer process provides the private sector access to skilled and knowledgeable people, new processes and techniques, and facilities and equipment often not available elsewhere. Transferring Air Force-developed technology with potential commercial applications is part of the AFMC mission. It is the fourth objective under the AFMC goal to sustain technological superiority.

The Technology Transfer program, which is managed by the Command Transfer Team in the TTO, is compliant with public law and is not controlled by the Federal Acquisition Regulations. Each product, logistics, test center, laboratory, weapon system, product, and materiel program office accomplishes the actual transfer of technology with the aid of their local Office for Research and Technology Application (ORTA).

## **10.2 PURPOSE**

The purpose of the AFMC Technology Transfer Program is to provide the opportunities for others outside the Air Force to reap the benefits of Air Force technology research, development, and application. The Air Force intends to share its technical knowledge with all qualified people, agencies, businesses, and schools within the constraints of public laws.

### **10.2.1 Federal Technology Transfer Act of 1986 (P.L. 99-502)**

In an attempt to encourage private industry to use the technology available from federal laboratories, in 1986 Congress passed the Federal Technology Transfer Act (P.L. 99-502) which is codified in Title 15, Chapter 63, U.S.C. and entitled "Technology Innovation" more commonly referred to as the Federal Technology Transfer Act of 1986 (the Act). This law gave agencies authority to conduct cooperative research with outside parties and negotiate patent licenses. In addition, it set further guidelines for technology transfer and established the Federal Laboratory Consortium (FLC) for Technology Transfer with a formal charter. This Act provides the fundamental guidance for federal technology transfer. Here is a summary of the primary points contained in the law:

1. It gives agencies and laboratory directors latitude to enter into cooperative research and development agreements and to negotiate patent licenses.
  - a. It authorizes exchange of people, services, facilities, equipment, or other resources to conduct specified R&D efforts consistent with the laboratory mission.
  - b. It does not include procurement contracts or grants.
  - c. It gives preference to small business and business in the United States.
2. It permits royalty income from patent licensing and assignment to be distributed directly to the inventor(s) and producing laboratory.
  - a. At least 15 percent of the royalties must be paid to the inventor(s).
  - b. The balance of the royalties go to the laboratory to be used for additional awards, incidental expenses, or further scientific exchange or education/training consistent with the mission.
3. It makes technology transfer a job requirement of every laboratory scientist and engineer.
  - a. Management must consider positively technology transfer in job descriptions, performance evaluations, and promotions.
  - b. Laboratories must establish a cash award program to reward employees for technology transfer accomplishments, inventions, and other scientific achievements (using existing incentive award statutory authority).
4. It increases the ORTA involvement in laboratory management development programs.
  - a. It requires at least one full-time equivalent ORTA position for each laboratory having 200 or more full-time scientific, engineering, and related positions.
  - b. Managers must include ORTA people in overall laboratory management development programs to ensure full participation by managers in technology transfer processes.
  - c. ORTA employees are to participate, where feasible, in regional, state, or local technology transfer efforts.
5. It provides a home for the FLC within the National Institute of Standards and Technology (NIST). FLC membership consists of approximately 400 federal laboratories from 11 different agencies.
  - a. The FLC will use 10 percent of its budget for demonstration projects in technology transfer.
  - b. The FLC will not engage directly in transfer of technology but will support and help laboratories in this function.

Included in the Federal Technology Transfer Act is the authority for establishing a CRDA between an agency (laboratory) and an applicant (collaborator) from the private sector. The authority is found in 15 U.S.C. § 3710a, and the implementing regulations issued by the federal agencies. The Act has put teeth into an already existing federal licensing program. By combining the already existing licensing program of the Government (authorized under 35 U.S.C. §§ 207 and 208 and 37 Code of Federal Regulations [CFR] 404 et seq.) with the use of CRDAs as authorized under the Act, the Government now has the mechanisms necessary for effectively transferring its vast

source of technology to the private sector. The Act, by authorizing federal laboratories to enter CRDAs, has enabled federal laboratories to transfer the much needed "know-how" essential in a true transfer of technology to the private sector.

### **10.2.2 Executive Order 12591, Facilitating Access to Science and Technology**

Executive Order 12591, Facilitating Access to Science and Technology (effective April 10, 1987), reiterates many of the provisions of the Federal Technology Transfer Act as well as several provisions contained in the patent laws. It directs the head of each executive department and agency, to the extent permitted by law, to promote cooperative R&D efforts among the federal laboratories, state and local governments, universities, and the private sector "to assist in the transfer of technology to the marketplace," including granting title to the results of federally funded R&D to all contractors, regardless of size, in exchange for royalty-free use by, or on behalf of, the Federal Government. In addition, the Executive Order calls for:

1. Establishing a technology share program for selected federal laboratories to work with private industry consortia in areas of research and technology with potential long-term national benefits;
2. A program of exchanges between scientists and engineers in federal laboratories and the private sector;
3. A program to ensure that American companies can exploit research and technology developed abroad;
4. The accelerated transfer of technology from the Department of Defense (DoD); and
5. An examination of the potential for Basic Science and Technology Centers funded, in part, by the federal departments and agencies.

### **10.2.3 The National Competitiveness Technology Transfer Act**

The National Competitiveness Technology Transfer Act of 1989 (P.L. 101-189) makes technology transfer an official mission of all Government-supported laboratories. It amends the Stevenson-Wydler Technology Innovation Act of 1980 (P.L. 96-480) and the Act to grant contract-operated federal laboratories — like Sandia National Laboratories and Los Alamos National Laboratory — the authority to enter into CRDAs, authority that Government-operated federal laboratories have under the Act.

The Act not only encourages technology transfer, but also makes each laboratory science and engineering professional employed by the Government, as long as it is consistent with the agency's mission, responsible to transfer technology. The Act provides the authority for the Government laboratory to enter CRDAs and negotiate licenses. It also provides that funds received under a CRDA or from a license to remain within the laboratory providing the technology. In addition, the Act provides that at least 15 percent of any royalties collected through the licensing of federally

owned patents or patent applications will be shared with the inventors if the inventors have assigned their ownership rights to the Government. The majority of the remaining balance of these royalty payments will go to the federal laboratory providing the technology.

### **10.3 PROCESS**

Within AFMC, we accomplish technology transfer in several ways. One can transfer intellectual property as well as provide access to scientific, engineering, and technical support — including laboratories' test facilities and skilled people—through Cooperative Research and Development Agreements (CRDAs) and other mechanisms. Technology transfer by the product, test, and logistics centers will also consist of providing products and services. The products are those produced through specialized manufacturing, repair, and test capabilities. The services provided include technical assistance with manufacturing, repair, and test capabilities.

The TTO houses the Command Transfer Team which serves an important role in technology transfer in AFMC as shown in Figure 10.3-1. They are responsible for command policy, training, and facilitating the Command Transfer Integrated Planning Team. The TTO maintains the AFMC Technology Transfer Handbook and manages the Technology Transfer Agreement Tracking Database.

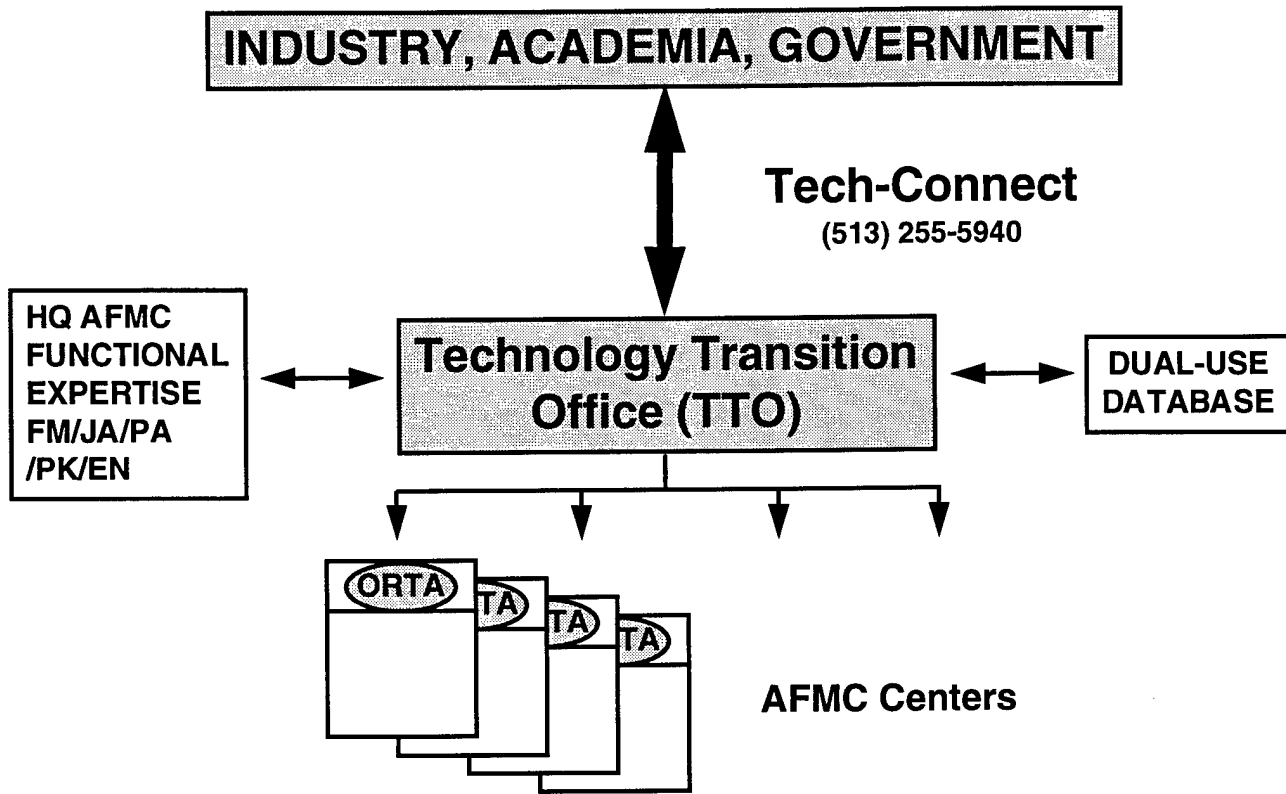
The TTO is the clearinghouse for information on validated technologies available in the laboratories and centers and it can be used as the interface with the functional expertise available within AFMC. TECH CONNECT, a technology information hotline operated by the TTO helps the commercial sector learn about potential transfer opportunities and helps the Air Force and other government agencies search for Air Force technology information (1-800-203-6451).

This section describes the macro process for the AFMC technology transfer program. The process is multi-layered and details can be found in the AFMC Technology Transfer Handbook (available from ASC/SMT or your local Office for Research and Technology Application (ORTA)).

Even though ASC/SMT manages the transfer program, each operating location carries out the actual day-to-day program operations. The actual transfer method/vehicle may vary based on the technology and/or the customer or client. The Office for Research and Technology Application at each operating location offers assistance in each transfer (identifying the appropriate vehicle, complying with public law, and measuring results). The detailed transfer process entails a large number of specific process steps.

The Transfer sub-PAT divided the Master Process into the six major steps depicted in Figure 10.3-2. These steps need not be performed sequentially, and may take place simultaneously during specific transfer activities. Some steps may occur annually or quarterly, and others may occur only for specific transfer cases.





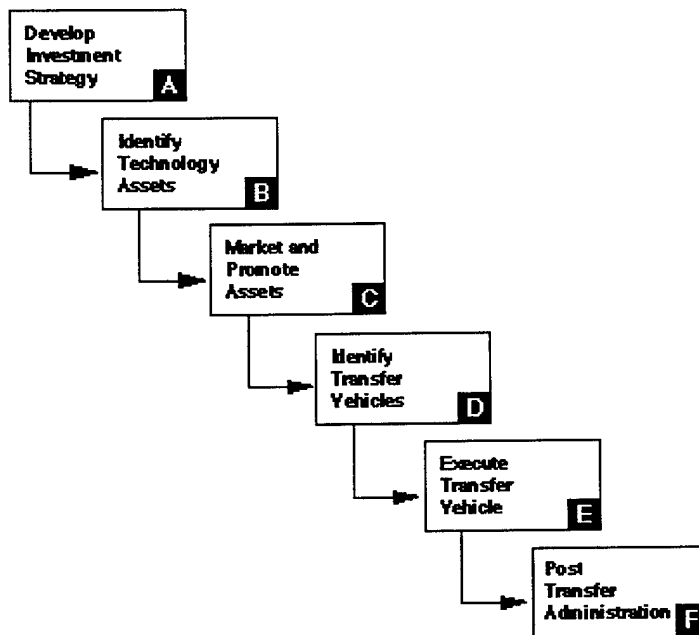
**Figure 10.3-1** The Role of Tech Connect in Technology Transfer

#### **A. Develop Investment Strategy**

The intent of Block A, Develop Investment Strategy, is to integrate technology transfer into the AFMC technology investment strategy. This block takes technology input and transfer administration requirements from the operating locations and coordinates them with the overall command direction in technology.

#### **B. Identify Technology Assets**

The activities in this section identify the technologies, processes, resources, and capabilities available for transfer. These include facilities and people who could transfer on a time-allowable basis. The intention is for the focal points to use Air Force technology databases.



**Figure 10.3-2** The Six Step Technology Transfer Process

### **C. Market and Promote Assets**

The third major block of the technology transfer process promotes the inventory of assets and links them with potential clients. These steps increase technology awareness of an increased number of potential clients.

### **D. Identify Transfer Vehicles**

In this section of the process, the focal point, team members, and the client select the transfer vehicle most appropriate for a specific technology. That vehicle is a function of factors such as the nature of the technology, the client, and the planned implementation.

### **E. Execute Transfer Vehicle**

The activities in Block E constitute the actual transfer of the technology. This section ensures the Air Force complies with public law and establishes the collection of metrics.

## **F. Post Transfer Administration**

After technology is transferred, the focal point and internal team members account for all of the transfer activities, advertise the success, and reward and recognize the Air Force participants. This section tracks success against the goals set in the investment strategy process . It provides for accountability and the feedback of metrics to the rest of the process, and measures of performance, lessons learned, and public relations.

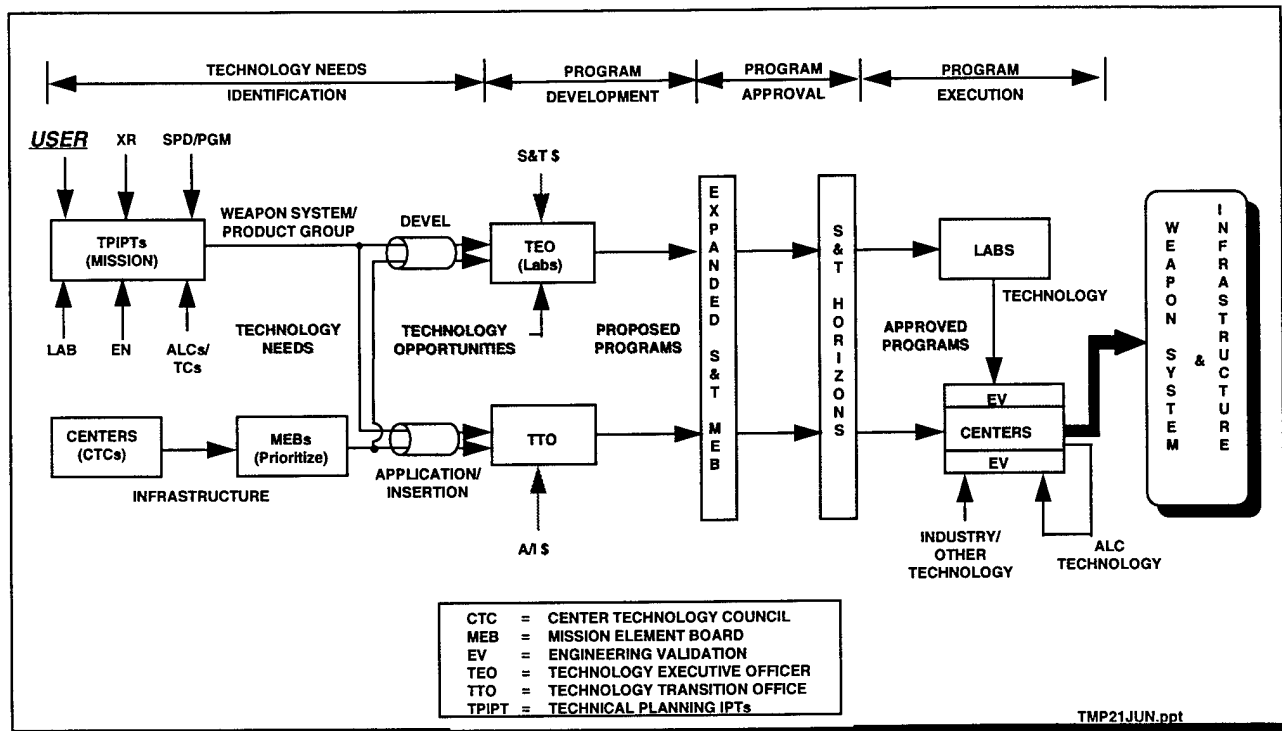
## **10.4 REFERENCES**

There is a significant amount of additional information on technology transfer in the AFMC Technology Transfer Handbook available from:

ASC/SMT Bldg 22  
Command Transfer Team  
2690 C St STE 5  
Wright-Patterson AFB, OH 45433-7412  
(513) 255-7993  
FAX (513) 476-7282

# CHAPTER 11

## CUSTOMER PERSPECTIVE



This chapter discusses the Technology Master Process (TMP) through the perspective of various customers. Specifics on each of the TMP elements may be found in Chapters 2 through 10.

## **11. PROCESS CUSTOMERS HAVE A VOICE**

TMP customers, whether they are at a MAJCOM, in an office at a product, logistics, or test center, at Air Staff, or in industry have a voice in influencing and improving the TMP. The process involves participation and feedback through the normal course of satisfying deficiencies and needs with solutions in the field. There are annual customer surveys that are solicited to improve the process. The senior leadership of the TMP stakeholders can express their views during the Expanded S&T MEB. Liason officers in the MAJCOM, in the TTO, and in the Program Offices can aid in monitoring AFMC activity and can influence the process. Some specific customer perspectives are discussed in the following paragraphs.

### **11.1 SYSTEM PROGRAM DIRECTOR / CHIEF OF ENGINEERING**

For those of you in the Weapon Systems offices, your program managers will retain total control over the technology elements of their programs. However, the Master Process will offer you new opportunities. The Technology Transition Office (TTO) allows one-stop shopping for current information on mature technologies developed within the Air Force laboratories and by industry. A technology chapter will be required in the Integrated Weapon System Master Plan (IWSMP) documenting your planned near-term and long-term technology improvements. As part of the TMP, these plans will be consolidated for each mission area by the Technical Planning Integrated Product Teams (TPIPTs), where you will be represented. These teams will help identify any potential or available technologies to match your requirements. As your requirements are identified on these teams, they will eventually become part of the AFMC S&T investment plan.

The engineering validation process at your product, logistics, or test center will provide an objective risk assessment of applying a specific technology to your system. The TTO will provide awareness into other potential technologies through access to the database of mature technologies.

### **11.2 LABORATORY SCIENTISTS AND ENGINEERS**

The TMP enhances the ability to incorporate new technology into systems by bringing the technology needs and available solutions into focus within the TPIPTs. For example, needs from the TPIPTs and CTCs and proposed laboratory development programs are included the AFMC S&T investment plan. The engineering validation aspect of the TMP will provide a risk assessment of your technology to ensure the recipient is satisfied with the technology and is willing to accept it for a particular application. The transfer function will be continued through the laboratory and center Offices of Research and Technology Application (ORTAs).

The TMP offers the capability for transitioning technology to the product, logistics, and test centers in an efficient manner. Your day-to-day interface with the program offices will continue; however, your interaction with the TPIPTs means you'll be considering technologies to satisfy needs actually defined in the Development Plans, IWSMPs, product master plans, and material master plans.

### **11.3 PRODUCT, LOGISTICS, AND TEST CENTER PERSONNEL**

A major change created by the TMP for those of you at the centers is the formation of the Center Technology Councils (CTCs). No longer will individual engineers have to chase down funding for a technology project, research through various organizations for existing technologies, or worry about project funding through completion. One-stop shopping will be provided through the CTCs, locally staffed and operated under the center commander's direction.

The centers will get their support from the Technology Executive Officer (TEO) and TTO to create and develop appropriate activities to develop, transfer, or insert technologies into new and fielded systems, products, materiel, and infrastructure. The centers will have program management authority over their specific application/insertion technology programs.

Through the ORTA, each center will have responsibility for local technology transfer. These ORTAs will be dedicated to transferring center technologies outside the Air Force. By focusing more technology insertion and transfer activities at the centers, the TMP delegates responsibility and accountability to the appropriate level.

### **11.4 INDUSTRY**

Industry plays an important role in the TMP. You will continue to interact daily with the program offices and laboratories. In addition, you will be able to access the TTO and the CTCs. The TTO will have a current list of technologies, both Air Force and industry, in development and those that have been validated for use. You can interact directly with the CTCs on any short or long-term application / insertion technologies. The CTCs will assist you by presenting to the TTO any application / insertion technologies that could benefit the rest of the Air Force. Eventually, there will be an all-inclusive database from which you can solicit Air Force technology requirements which are applicable, and releasable, to industry.

As one example of how the TMP will operate for a typical situation involving industry, consider the requirement for the B-1B to assume a conventional warfighting role. The B-1B System Program Director (SPD) would interrogate the mature technology database in the TTO for any applicable technology. He would also present his operational requirement to the appropriate mission area TPIPTs for consideration of both the short- and long-term associated technology requirements.

## 11.5 USERS/MAJCOMs

Technology can be our best friend or our worst nightmare depending on whether we or our enemies possess the latest advances. For the ultimate customers of our technology, those of you in the operating commands, the TMP becomes crucial. Your technology requirements must be satisfied and quickly. At the same time, budget realities require the process to be as efficient as possible.

Your primary interaction with the TMP will be through the TPIPTs. These teams include user and AFMC representatives as necessary to allow you to tell the technology community your mission capability requirements. Together with the other team members, you will determine which system concept options and associated technologies should be pursued to meet your requirements. Most TPIPTs focus on specific mission areas. For example, the Air-to-Surface TPIPT involves itself with strategic attack, interdiction, and close air support mission areas. ACC would be a primary customer for this TPIPT. You will have your representative on teams that cover your mission areas; however, both your future system-specific weapon and infrastructure technology needs are primarily conveyed to the TMP through the program offices and their respective master plans.

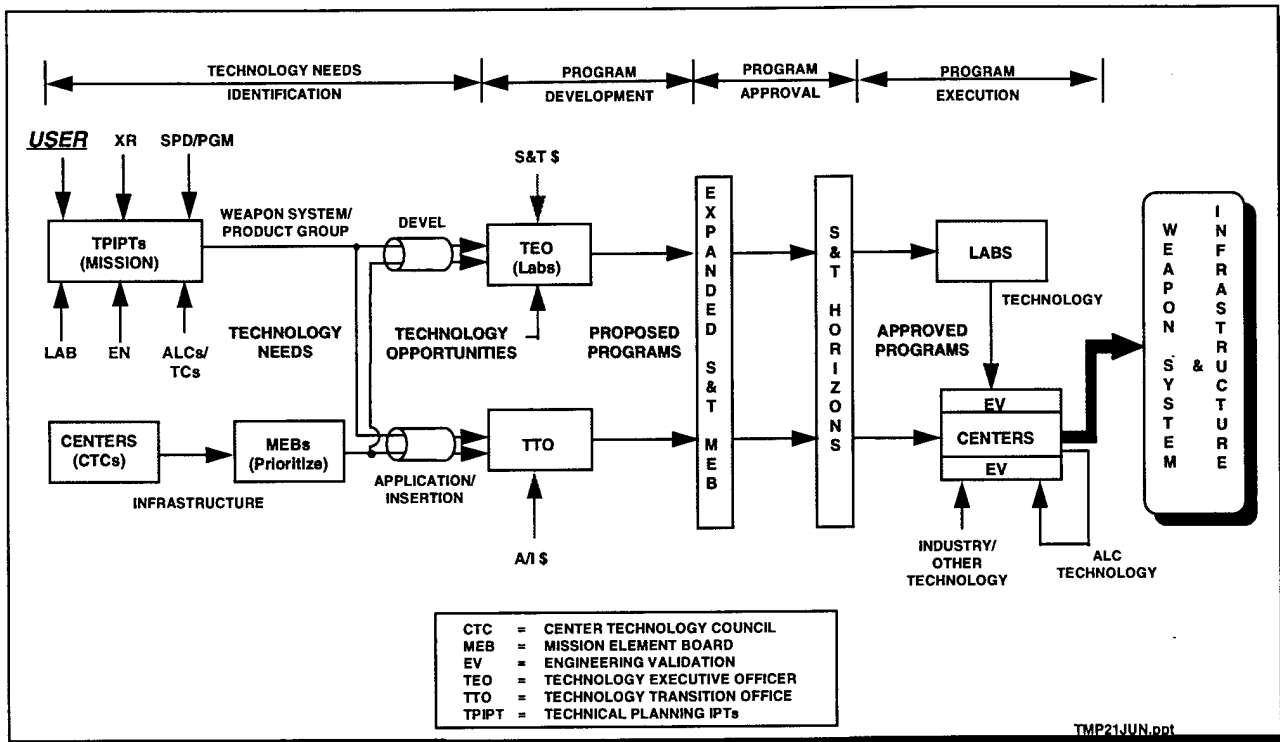
The program office representative will bring his respective plan to each of the applicable TPIPTs. These plans and your participation on the teams, will spell out your technology needs by individual weapon system, products, or materiel, but will be recategorized according to mission area, e.g., air-to-air and air-to-ground to match the organization of the TPIPTs. An output from each of these teams will be a development plan and each product center will combine and prioritize all of the technology needs for its TPIPTs in a technology investment recommendation.

The outputs from the TPIPTs and CTCs are integrated into the S&T investment plan at the Expanded S&T MEB. The plan is annually updated to maintain a 25 year horizon for technology requirements. The plan is presented to the AFMC leadership at the S&T Horizons conference. (Requirements approved for the first six years will be funded in the current Program Objective Memorandum (POM). The list of weapon system, products, and materiel technology needs is forwarded to the Air Force laboratories where they allocate their own funds and research your requirements. The infrastructure technology needs are tied to Program Element (PE) funds and forwarded to the TTO where they allocate the identified funds to each of the product, logistics, and test centers for project execution.

On occasion, industry will approach you or the program offices directly with solutions to technology needs. With the TMP, proposed technology solutions may be sent to one of the product, logistics, or test centers to be validated. This gives you an unbiased assessment of the technological risk involved with the contractor's technology and allows you and your program office to make a decision as an educated consumer. In addition, a list of all validated technologies is sent from the centers to the TTO. Through the TMP, the TPIPTs provide the focus for satisfying mission deficiencies with proven technology solutions.

# APPENDIX A

## COMMENT FORM



The comment form included as appendix A may be used to provide suggestions and comments to HQ AFMC/ST for the improvement of the TMP handbook.



## COMMENT FORM

This handbook, like the Technology Master Process itself, will continue to evolve, and we are interested in your comments. Please remove this page from the handbook, write your comments in the space below, and return the form to us at the address below. You do not need to include your name or telephone number if you wish to remain anonymous. Thank you for taking the time to respond.

Technology Master Process Handbook  
Attn: Richard R. Paul, Brigadier General  
AFMC/ST

Name (optional) \_\_\_\_\_

Telephone (optional) \_\_\_\_\_

Comments \_\_\_\_\_

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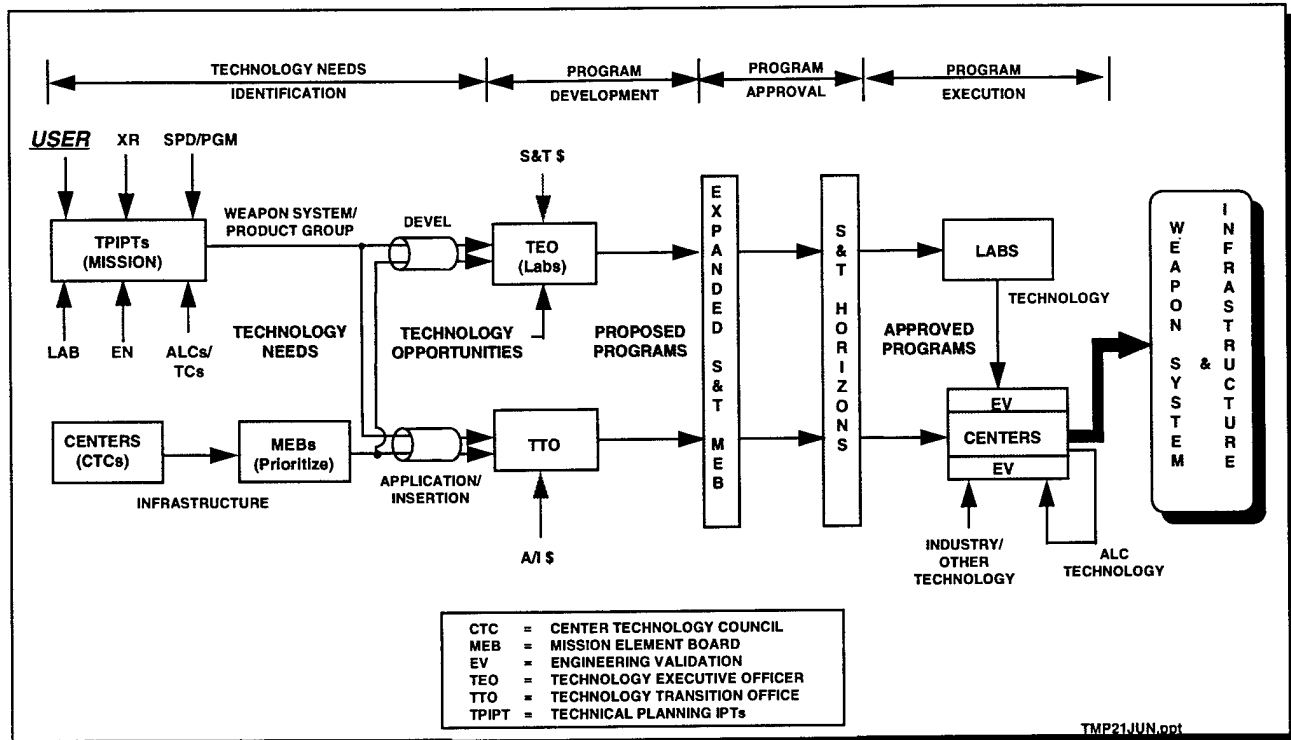
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# APPENDIX B

## DEFINITIONS AND ACRONYMS



This appendix includes many of the definitions and acronyms used throughout the handbook.

## INTRODUCTION

This section lists some of the more common definitions and acronyms used to describe the Technology Master Process (TMP).

### B.1 DEFINITIONS

**Advanced Technology Demonstrations (ATD)** — Laboratory projects within the 6.3A program which are intended to: (1) reduce risk by proof of principle demonstrations in an operational environment; (2) significantly enhance capabilities or cost effectiveness; (3) permit potential user (operator) participation in the program; and (4) be large enough (\$10-100 million) to provide a significant database.

**Air Force Acquisition Executive (AFAE)** — The Assistant Secretary of the Air Force (Acquisition) filling the role of Service Acquisition Executive (SAE) for the USAF.

**Cradle-to-Grave** — A description of the scope of involvement of a system or commodity management task throughout its life cycle from Milestone I (Demonstration/Validation phase) through system retirement including retirement from foreign governments. This insures that management considers the impact of its decisions not only on development activities, but also on the operational phase which can span several decades.

**Designated Acquisition Commander (DAC)** — The individual who functions as the Program Executive Officer (PEO) on programs that are not assigned to a PEO. The commanders of product centers and logistics centers act in this capacity. DACs, like PEOs, are accountable to the AFAE for execution of their assigned acquisition programs.

**Development System Manager (DSM)** — The lead individual at a product center when the System Program Director (SPD) located at a logistics center delegates a specific development task to a product center. The DSM reports directly to the SPD.

**Infrastructure** — All facilities and equipment owned by AFMC necessary to repair, maintain, modify, and retire fielded weapon systems and commodities; perform developmental, operational and qualification testing; and perform laboratory R&D, measurement, analysis, and organic computational / modeling capabilities. Examples: Robotic paint stripping and test ranges.

**Integrated Weapon System Master Plan (IWSMP)** — The IWSMP will combine elements of the Integrated Program Summary (See DoD 5000.2) and the Weapon System Master Plan (WSMP) into a single document for 12 year projections of systems capability, threats, acquisition strategy, costs, integrated logistics support, post production support planning, and system phase-out.

## **Laboratory Program Categories**

The program categories are described below in definitions extracted from AFI 65-601 Vol 4 (3600) dated 30 November 1993, page 84.

**6.1** Provides for research, development, test, and evaluation associated with operation and management of Air Force Laboratories whose primary mission is research in support of Defense Research Sciences and Exploratory Development. It includes studies of all types to acquire fundamental knowledge in areas of physical, mathematical, engineering, environmental, materials, and life sciences. 6.1 research is conducted by both universities on the post-doctoral level and Air Force laboratories.

**6.2** Provides for research, development, test, and evaluation of programs that relate to the exploration of alternatives and concepts before development of specific weapon systems. 6.2 research attempts to apply military utility to a specific technology.

**6.3** Provides for research, development, test, and evaluation of strategic, offensive, and defensive systems in advanced, full-scale engineering and operational systems development. The Science and Technology community breaks down the 6.3 category further as follows:

6.3A Advanced development and critical experiments. 6.3A activity attempts to refine basic and exploratory research and demonstrate the military utility of a technology prior to hand-off to the engineering community or program offices. The originating laboratory writes a Technology Transition Plan (TTP) which is, essentially, a "contract" between the laboratory and its customers, e.g., EN, program office, and MAJCOM. The TTP contains the technology transition criteria which was agreed to by the customers prior to being accepted.

6.3B Advanced development for specific applications either by the Air Force engineering community or program offices. 6.3B activity usually occurs in the Concept Definition phase and engineering validation usually takes place at this stage.

**6.4** Provides for research, development, test, and evaluation of tactical development programs in advanced, full-scale engineering and operational development. 6.4 projects are usually accomplished at product center program offices for a specific application.

**Materiel** — One of three management categories for Air Force programs. A Materiel Group differs from a Product Group by the fact that a Materiel Group does not require a standing development capability. The single manager for the Materiel Group is the Materiel Group Manager (MGM) who has the same responsibilities as the Weapon System, SPD, and PGM for their respective materiel. Materiel Groups normally receive consolidated management for sustainment largely for reasons of economy of scale and specialization of technical/engineering expertise. Materiel Groups manage a range of products from repairable to end items, but the frequency of major

development and iteration activity is too low to justify an on-going development activity. The MGM will perform the master planning function for their Materiel Group and document it in a Materiel Master Plan. Working as a member of the integrated product management team, the MGM's customers for the daily sustainment products and services and new equipment acquisition are the MAJCOM Wing Commanders, other DoD operating units, and FMS customers. The MGM's customers for integration of new development and technology transition are the respective PGMs and SPDs. Due to the characteristics of a Materiel Group, the MGM will reside at a logistics center. If a major new development warrants breakout from the MGM, a new single manager will be identified. When a new development is completed, management responsibility will revert to the parent MGM.

**NSIA** — (National Society of Industry Association) Focal point for interactions between the DoD and industry. National headquarters in Washington, D.C. Five offices throughout the country. The Dayton chapter of the NSIA has the largest office with 93 member companies and 26 of these serving on an executive committee. The objective of the Dayton chapter is to interact specifically with AFMC/ASC.

**Pervasive Technologies** — Technologies potentially having multiple applications for improving reliability, maintainability, supportability, performance, etc.; reducing life cycle costs; addressing environmental issues; etc. of end products or processes. Examples: Microcircuit technology and software.

**Process Analysis Paper (PAP)** — A paper developed by the PAT which identifies their high leverage processes or critical activities. The PAP discusses the process, outlines possible solutions, and presents a recommendation. The PAP represents the vehicle for obtaining commander closeout of major process changes.

**Process Action Team (PAT)** — A group of functional experts brought together to develop each of the eight IWSM functional core processes

**Productivity, Reliability, Availability, and Maintainability (PRAM)** — The new application of proven technologies to improve productivity, reliability, availability, or maintainability of existing or developing systems.

**Products** — One of three management categories for Air Force programs. Product groups are compilations of several specific products in all life cycle phases and are characterized by an on-going development requirement as well as a much larger cumulative sustainment effort. The single manager for a Product Group will be a Product Group Manager (PGM). While responsibilities for a PGM are the same as a Weapon System SPD for their respective product(s), the PGM's product is in direct support of one or more Weapon System SPDs and is sometimes provided directly to Air Force users and other customers, both within and outside the DoD. Working as a member of the integrated product management team, the PGM's customers for daily sustainment products and services are the

MAJCOM Wing Commanders, other DOD operational units, and the Foreign Military Sales customers. The PGM's customers for integration of new development and technology transition are one or more Weapon System SPDs. A PGM may be located at either a product center or logistics center. In accordance with ISWM tenets, determination of the location will be based on the preponderance of the activity (acquisition or sustainment) of the Product Group. The number of Product Groups will most likely be limited and carefully maintained given the associated manpower requirements.

**Program Executive Officer (PEO)** — The corporate operating official who supervises a portfolio of mission-related Acquisition Category (ACAT) I and other selected programs. The PEO is accountable to the AFAE.

**Reliability and Maintainability Technology Insertion Program (RAMTIP)** — A program which accelerates insertion of emerging technologies to improve the reliability and maintainability of existing or developing systems.

**System Program Director (SPD)** — That individual in an AFMC SPO who is ultimately responsible and accountable for decisions and resources in overall program execution. The single face to the user who oversees the seamless processes. SPD is the designated title for the single manager of a program who reports to a PEO or DAC.

**System Program Office (SPO)** — The integrated AFMC organization responsible for cradle-to-grave military system management.

**System Support Manager (SSM)** — The lead individual at the logistics center responsible for support when the SPD is located at the product center. The SSM reports directly to the SPD.

**Technical Application Team (TAT)** — A short-term (2-3 year) technology requirements team organized to solve a specific problem and with a near-term perspective (0-5 years). TATs are established in XRs, involve all key stakeholders, and focus development / transition planning on specific needs.

**Technical Planning Integrated Product Team (TPIPT)** — A technical requirements team organized by mission area or functional area with a long-term perspective (0-25 years). TPIPTs are established in XRs, involve all key stakeholders, and operate continuously with regular personnel rotation. They produce long-range development plans, identify corresponding technology needs, and make investment recommendations (See Chapter 2).

**Technology Area Plan (TAP)** — Technology plan approved by AF/AQ which documents the roadmap for work approved to proceed through 6.2 and 6.3A programs. These plans can go to industry and the Scientific Advisory Board (SAB).

## **Technology Terms**

**Insertion** — The progression of product and process technology from laboratory development to further development (6.3B, 6.4, or other) for an Air Force application to a new or fielded system. The progression of product and process technology to initial production or use for Air Force application to a new or fielded system. The actual procurement or modification of a system which contains a new technology. The movement of technology into operational use.

**Transition** — The progression of product and process technology from laboratory development to further development (6.3B, 6.4, or other) for an Air Force application to a new or fielded system. The first time movement of a technology usually involves prototyping or a similar engineering effort. This includes infusion the adaption of non-Air Force developed technology for Air Force use.

**Transfer** — The movement of technology outside the Air Force to other government agencies or to industry for commercialization. The movement of technology from the Air Force through interaction with industry (large and small), academia, and state and local governments.

**Infusion** — The adaption of non-Air Force developed technology for Air Force use.

**Weapon System** — Aircraft, strategic and tactical missiles, communications-electronics (C-E) systems, space systems, vehicles (including 463L Material Handling Equipment (MHE)), vehicles acquired as support equipment, munitions, MHE, and integrated warning and assessment systems (extracted from AFR 400-3).

**Weapon System** — One of three management categories for Air Force programs. The primary customer for the Weapon system is the MAJCOM. The MAJCOM will come to the SPD for initial system requirements, issues, or changing system requirements. The SPD may draw from all available command resources in order to provide the executable options to meet the customers' requirements. Their products will be provided directly to the MAJCOM. The SPD will perform the master planning function for their system and document it in a Weapon System Master Plan. An integral part of the master planning process is the evolution and transfer of technologies into the system. Examples of these programs include the F-22, F-15, B-2, JSTARS, MILSTAR, etc.

## B.2 ACRONYMS

ACT	Advanced Computer Technology
AEDC	Arnold Engineering Development Center, Arnold AFB, TN
AF	Air Force
AFAE	Air Force Acquisition Executive
AFDTC	Air Force Developmental Test Center, Eglin AFB
AFFTC	Air Force Flight Test Center, Edwards AFB
AFMC	Air Force Materiel Command
AFOSR	Air Force Office of Scientific Research
AFR	Air Force Regulation
AL	Armstrong Laboratory (Brooks AFB)
ALC	Air Logistics Center (synonymous with Logistics Center (LC))
AMC-FAST	Army Materiel Command Field Assistance in Science and Technology
ARPA	Advanced Research Projects Agency
ASC	Aeronautical Systems Center
ATD	Advanced Technology Demonstration
BOA	Board Of Advisors
CIP	Component Improvement Program
COEA	Cost and Operational Effectiveness Analysis
CPIP	Commodity Product Improvement Program
CPP	Capital Purchase Program
CRDA	Cooperative Research and Development Agreement
CRMT	Computer Resources Management Technology
CTC	Center Technology Council
DAC	Designated Acquisition CC (ALC/CC)
DCS	Deputy Chief of Staff
DDSP	Defense Development Sharing Program
DEM/VAL	DEMonstration, VALidation
DoD	Department of Defense
DoDD	Department of Defense Directive
ESC	Electronic Systems Center
ESIP	Embedded computer resources Support Improvement Program
ETS	Emerging Technology Summary
EV	Engineering Validation (Chapter 9)
EVAC	Engineering Validation Assessment Checklist (Chapter 9)
EVT	Engineering Validation Team (Chapter 9)
FACTS	Fasteners, Actuators, Connectors, Tools, and Subsystems
FCR	Functional Capability Requirements
FLC	Federal Laboratory Consortium (Chapter 10)
FMS	Foreign Military Sales
FWE	Foreign Weapons Evaluation



## B.2 ACRONYMS (Cont.)

GOSC	General Officer Steering Council
HSC	Human Systems Center
IBA	Industrial Base Analysis
ICA	Innovative Concepts Advocate
IIRP	Improved Item Replacement Program
IMIP	Industrial Modernization Incentive Program
IPDT	Integrated Product Development Team
IPLCP	Integrated Product Life Cycle Plan
IPS	Integrated Program Summary
IR&D/IRAD	Independent Research &/and Development
IWSM	Integrated Weapon Systems Management
IWSMP	Integrated Weapon System Master Plan
JDL	Joint Directors of Labs
JDMAG	Joint Depot Maintenance Activation Group
JIAD	Joint Integrated Avionics Directorate
JPCG-DM	Joint Policy Coordinating Group on Depot Maintenance
LANTIRN	Low Altitude Navigation and Targeting Infra-Red system for Night
LC	Logistics Center (Synonymous with ALC)
LENTAP	Logistics ENGINEERING Technology Application Program
LIFT	Logistics Improvement for Facilities and Technologies
LN <sub>s</sub>	Logistics Needs
MAA	Mission Area Assessment
MAJCOM	MAJor COMmand (referring to operational using command)
MANSCI	MANufacturing SCience
MANTECH	MANufacturing TECHnology program
MAP	Mission Area Plan
MEB	Mission Element Board (Chapter 4)
MGM	Materiel Group Manager
MMP	Materiel Master Plan
MNA	Mission Needs Analysis
MOA	Memorandum of Agreement
MPT	Manpower Personnel Training
MTS	Mature Technology Summary (Chapter 9)
NATO	North Atlantic Treaty Organization
NIST	National Institute of Standards and Technology
NSAP	Navy Science Assistance Program
NSIA	National Society of Industry Association of critical domestic military production
OO-ALC	Ogden ALC
OC-ALC	Oklahoma City ALC
OPR	Office of Primary Responsibility

## B.2 ACRONYMS (Cont.)

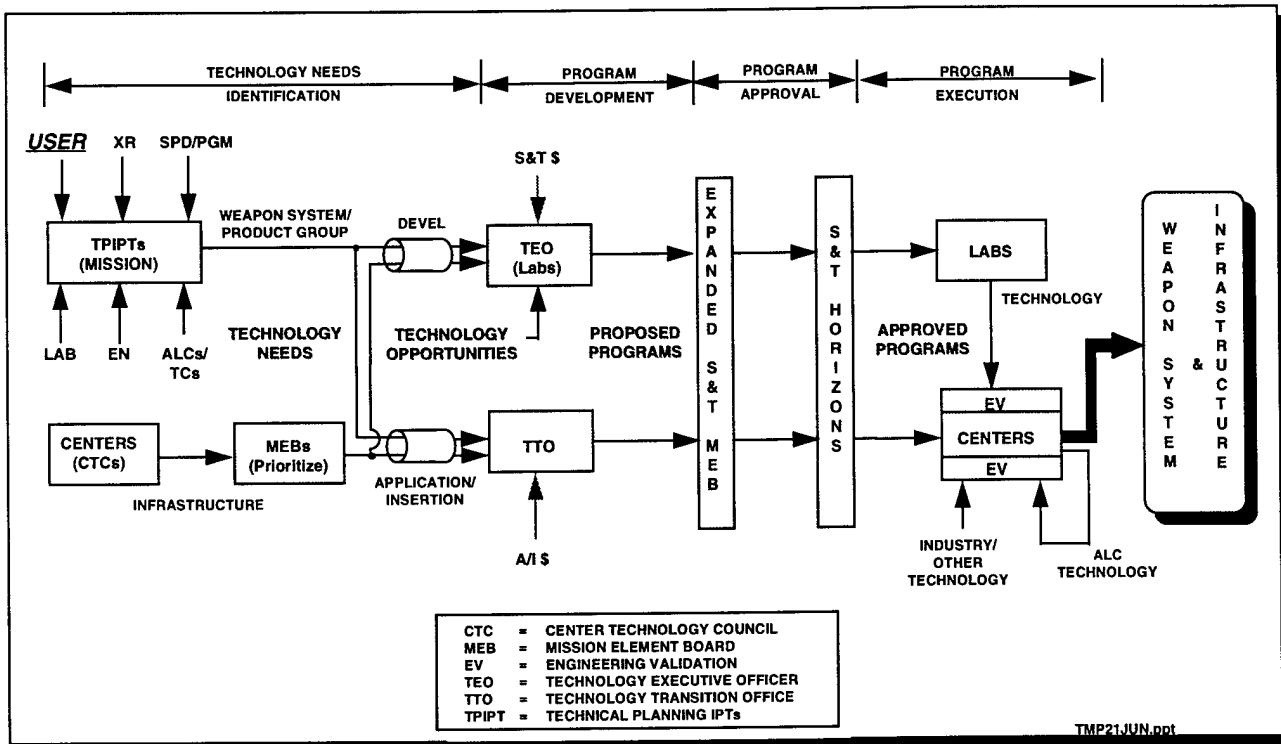
ORD	Operational Requirements Document
ORTA	Office for Research and Technology Applications
PAP	Process Analysis Paper
PAT	Process Action Team
PC	Product Center
PE	Program Element
PEO	Program Executive Officer
PGM	Product Group Manager
PIP	Prioritized Investment Plan
PIWG	Product Improvement Working Group
PL	Phillips Laboratory (Kirtland AFB)
PM	Program Manager
PMD	Program Management Directive
PMFP	Product Management Focal Point (Chapter 4)
PMP	Product Master Plan
POC	Point Of Contact
POM	Program Objective Memorandum
PPBS	Planning, Programming, and Budgeting System
PRAM	Productivity, Reliability, Availability and Maintainability
PTP	Program Technology Plan
PTTP	Pervasive Technology Transition Program
R&M	Reliability & Maintainability
RADC	Rome Air Development Center
RAMTIP	Reliability & Maintainability Technology Insertion Program
RDT&E	Research Development Test and Evaluation
REPTECH	REPair TECHnology program
RL	Rome Laboratory (Griffiss AFB)
RTTE	Responsible Technology Transition Engineer (Chapter 9)
S/W	SoftWare
S&T	Science & Technology
SA-ALC	San Antonio ALC
SAB	Scientific Advisory Board
SBIR	Small Business Innovative Research
SEAD	Suppression of Enemy Air Defense (Chapter 2)
SEI	Software Engineering Institute
SEMS	Systems Engineering Management System
SENTAR	Senior ENgineering Technology Assessment Review
SIP	Strategic Implementation Planning
SM-ALC	Sacramento ALC
SMC	Space and Missile Systems Center

## B.2 ACRONYMS (Cont.)

SPD	System Program Director
SPO	System Program Office
SSM	System Support Manager
STINFO	Science & Technology INfOrmation
STIP	Strategic Technology Investment Plan
T&E	Test and Evaluation
T2	Technology Transition
TAP	Technology Area Plans
TAPM	Technology Application Program Management
TAT	Technical Application Team
TBM	Theater Battle Management (Chapter 2)
TC	Test Center
TD	Technology Development Plan
TECHTIPs	TECHnology TIPs
TEO	Technology Executive Office
TI	Technology Insertion
TIIP	Technology Insertion Investment Plans
TIIP	Technology Insertion Improvement Program
TIP	Technology Investment Plan
TIRR	Technology Investment Recommendation Report
TISEP	Technology Insertion and Systems Engineering Process
TISP	Test Investment Strategy Plan (Chapter 4)
TMP	Technology Master Process
TPIPT	Technical Planning Integrated Product Team
TT	Technology Transition
TT	Technology Transfer
TTO	Technology Transition Office
TTP	Technology Transition Plan
VHSIC	Very High Speed Integrated Circuits
WL	Wright Laboratory (Wright-Patterson AFB)
WR-ALC	Warner Robins ALC

# APPENDIX C

## POINTS OF CONTACT



This appendix includes useful points of contact for further information on the TMP.